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INTRODUCTION

GENERAL INFORMATIONS

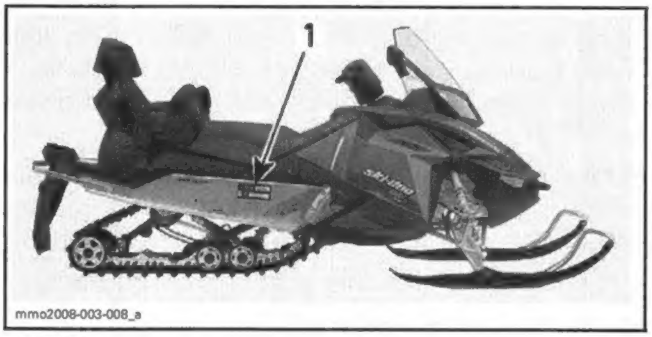
This shop manual covers the following BRP made 2008 REV XP series models:

MODEL	ENGINE TYPE
GSX Limited 600 HO SDI	593
GSX Limited 800R Power TEK	797
GSX Limited Touring 600 HO SDI	593
GSX Sport 500SS	593
MX Z Adrenaline 600 HO SDI	593
MX Z Adrenaline 800R Power TEK	797
MX Z Renegade 600 HO SDI	593
MX Z Renegade 800R Power TEK	797
MX Z Renegade X 600 HO SDI	593
MX Z Renegade X 800R Power TEK	797
MX Z TNT 500SS	593
MX Z TRAIL 500SS	593
MX Z X 600 HO SDI	593
MX Z X 800R Power TEK	797
SUMMIT EVEREST 800R Power TEK	797
SUMMIT X 800R Power TEK	797

The information and component/system descriptions contained in this manual are correct at time

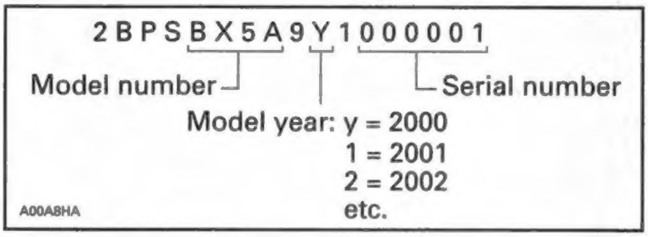
VEHICLE IDENTIFICATION NUMBER

Vehicle Identification Number Location


1
mmo2008-003-008_a

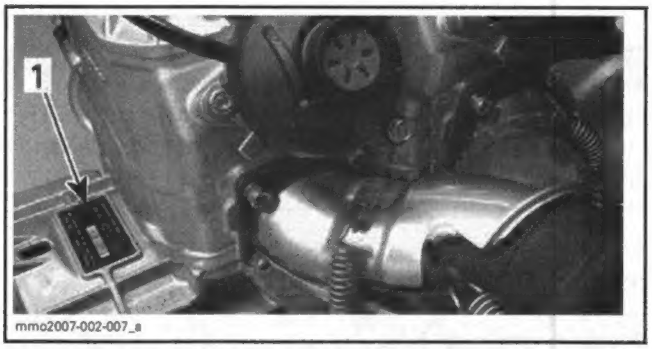
TYPICAL
1. Vehicle identification number

Identification Number Meaning


2BPSBX5A9Y1000001
Model number
Serial number
Model year: y = 2000
1 = 2001
2 = 2002
etc.
A00A8HA

ENGINE SERIAL NUMBER

Engine Serial Number Location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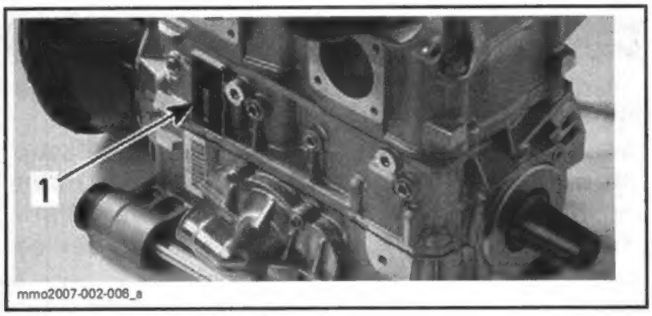
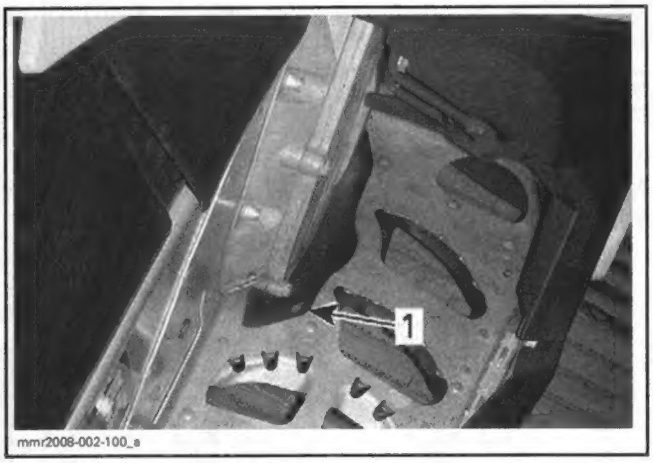
TYPICAL — 500SS AND 600 HO SDI ENGINES
1. Engine serial number



TYPICAL — 800R ENGINE
1. Engine serial number

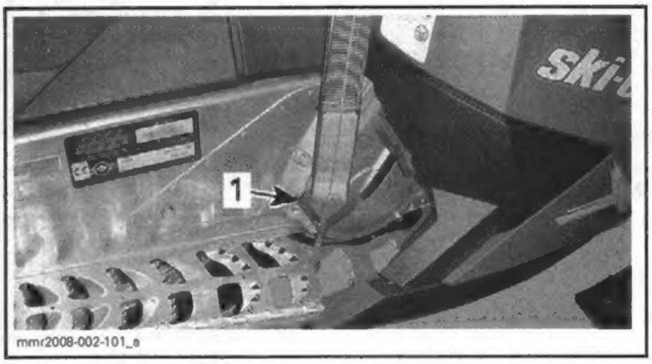
SNOWMOBILE LIFTING

To lift a REV XP securely, it is important to use the reinforced footrest holes.



1. Reinforced holes in footrest

Install lifting tool hooks in holes as shown.



1. Hook of lifting tool

CAUTION: Do not use footrest opening or steering column to lift the snowmobile. Frame or steering system could be seriously damaged.

ENGINE EMISSIONS INFORMATION

Manufacturer's Responsibility

Manufacturers of engines must determine the exhaust emission levels for each engine horsepower family and certify these engines with the United States of America *ENVIRONMENTAL PROTECTION AGENCY (EPA)*. An emissions control information label, showing emission levels and engine specifications, must be placed on each vehicle at the time of manufacture.

Dealer Responsibility

When performing service on snowmobiles that carry an emissions control information label, adjustments must be kept within published factory specifications.

Replacement or repair of any emission related component must be executed in a manner that maintains emission levels within the prescribed certification standards.

Dealers are not to modify the engine in any manner that would alter the horsepower or allow emission levels to exceed their predetermined factory specifications.

Exceptions include manufacturer's prescribed changes, such as altitude adjustments for example.

Owner Responsibility

The owner/operator is required to have engine maintenance performed to maintain emission levels within prescribed certification standards.

The owner/operator is not to, and should not allow anyone to modify the engine in any manner that would alter the horsepower or allow emissions levels to exceed their predetermined factory specifications.

EPA Emission Regulations

Some Ski-Doo snowmobiles manufactured by BRP are certified to the EPA as conforming to the requirements of the regulations for the control of air pollution from new snowmobiles engines. This certification is contingent on certain adjustments being set to factory standards. For this reason, the factory procedure for servicing the product must be strictly followed and, whenever practicable, returned to the original intent of the design.

The responsibilities listed above are general and in no way a complete listing of the rules and regulations pertaining to the EPA requirements on exhaust emissions for snowmobiles products. For more detailed information on this subject, you may contact the following locations:

FOR ALL COURIER SERVICES:
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
1310 L Street NW
Washington D.C. 20005

REGULAR US POSTAL MAIL:
1200 Pennsylvania Ave. NW
Mail Code 6403J
Washington D.C. 20460

INTERNET: http://www.epa.gov/otaq/

E-MAIL: otaqpublicweb@epa.gov

TIGHTENING TORQUE

Tighten fasteners to torque mentioned in exploded views and/or text, When they are not specified, refer to following table.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be renewed.

In order to avoid a poor assembling, tighten screws, bolts or nuts in accordance with the following procedure:

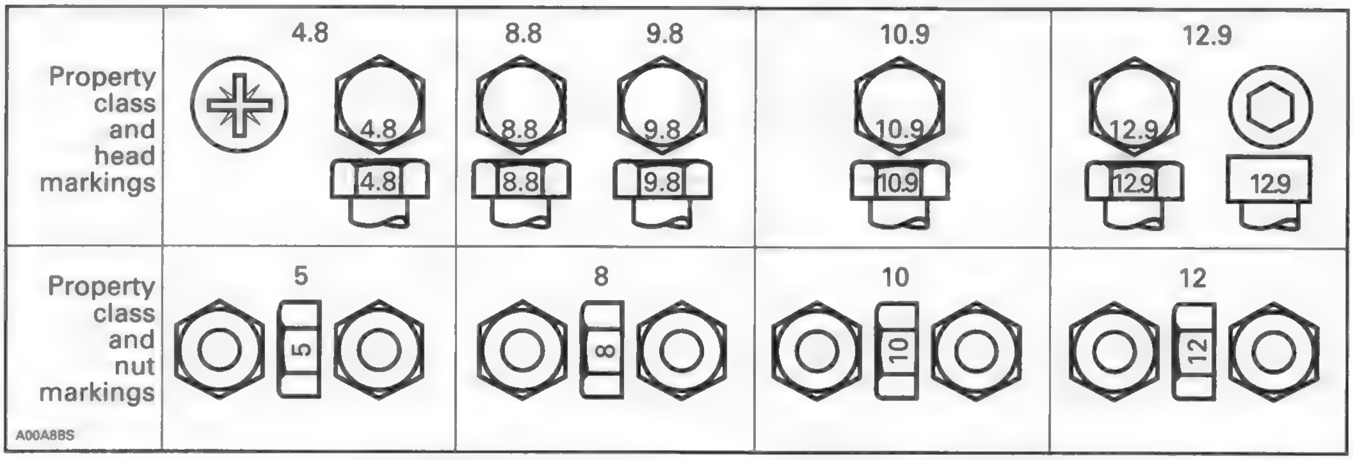
- Manually screw all screws, bolts and/or nuts.
- Apply the half of the recommended torque value.

CAUTION: Be sure to use proper tightening torque for the proper strength grade.

NOTE: When possible, always apply torque on the nut.

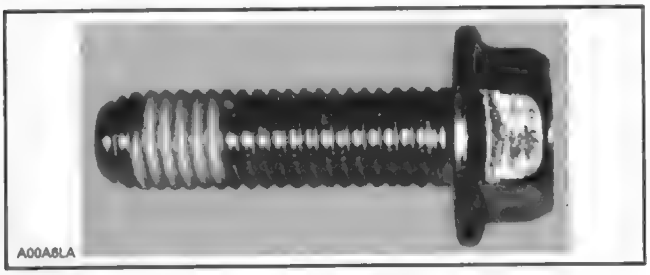
- Torque at the recommended torque value.

NOTE: Always torque screws, bolts and/or nuts in a criss-cross sequence.



FASTENER SIZE	**FASTENER GRADE/TORQUE**			
	5.8 Grade	**8.8** Grade	**10.9** Grade	**12.9** Grade
M4	1.5 – 2 N•m (13 – 18 lbf•**in**)	2.5 – 3 N•m (22 – 27 lbf•**in**)	3.5 – 4 N•m (31 – 35 lbf•**in**)	4 – 5 N•m (35 – 44 lbf•**in**)
M5	3 – 3.5 N•m (27 – 31 lbf•**in**)	4.5 – 5.5 N•m (40 – 47 lbf•**in**)	7 – 8.5 N•m (62 – 75 lbf•**in**)	8 – 10 N•m (71 – 89 lbf•**in**)
M6	6.5 – 8.5 N•m (58 – 75 lbf•**in**)	8 – 12 N•m (71 – 106 lbf•**in**)	10.5 – 15 N•m (93 – 133 lbf•**in**)	16 N•m (142 lbf•**in**)
M8	15 N•m (133 lbf•**in**)	24.5 N•m (18 lbf•ft)	31.5 N•m (23 lbf•ft)	40 N•m (30 lbf•ft)
M10	29 N•m (21 lbf•ft)	48 N•m (35 lbf•ft)	61 N•m (45 lbf•ft)	72.5 N•m (53 lbf•ft)
M12	52 N•m (38 lbf•ft)	85 N•m (63 lbf•ft)	105 N•m (77 lbf•ft)	127.5 N•m (94 lbf•ft)
M14	85 N•m (63 lbf•ft)	135 N•m (100 lbf•ft)	170 N•m (125 lbf•ft)	200 N•m (148 lbf•ft)

SELF-LOCKING FASTENERS PROCEDURE



TYPICAL — SELF-LOCKING FASTENER

The following describes the most common application procedures when working with self-locking fasteners.

Use a metal brush or a tap to clean the hole properly then use a solvent, let act during 30 minutes and wipe off. The solvent utilization is to ensure the adhesive works properly.

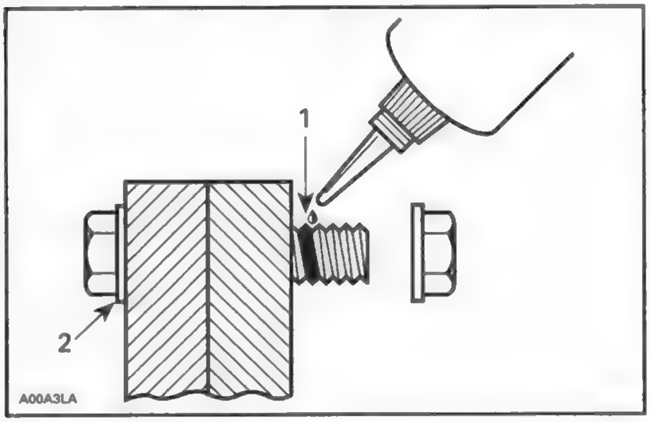
LOCTITE APPLICATION PROCEDURE

The following describes the most common application procedures when working with Loctite products.

NOTE: Always use proper strength Loctite product as recommended in this shop manual.

Threadlocker

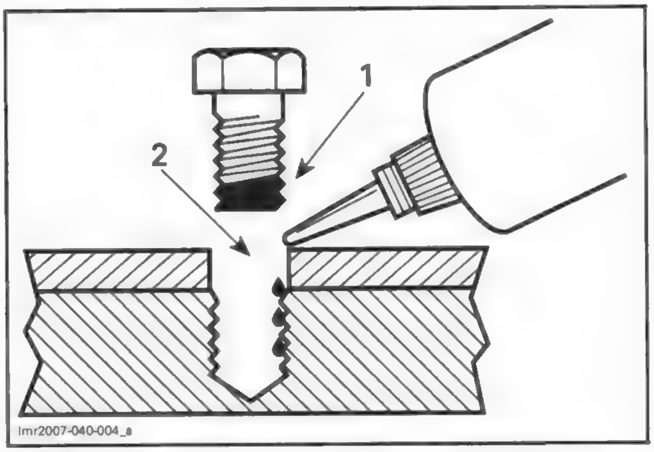
Uncovered Holes (bolts and nuts)



1. *Apply here*
2. *Do not apply*

- Clean threads (bolt and nut) with solvent.
- Apply Loctite Primer N (P/N 293 800 041) on threads and allow to dry.
- Choose proper strength Loctite threadlocker.
- Fit bolt in the hole.
- Apply a few drops of threadlocker at proposed tightened nut engagement area.
- Position nut and tighten as required.

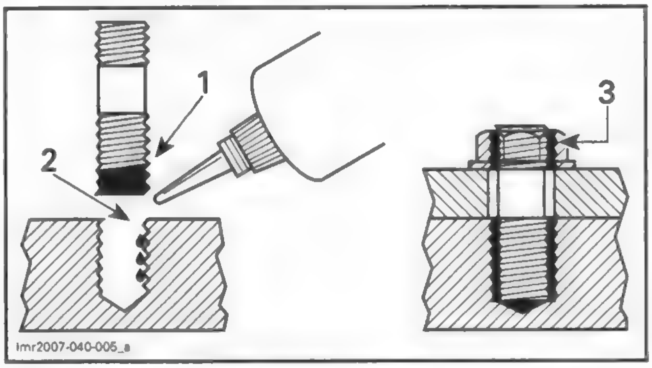
Blind Holes



1. *On threads*
2. *On threads and at the bottom of hole*

- Clean threads (bolt and hole) with solvent.
- Apply Loctite Primer N (P/N 293 800 041) on threads (bolt and nut) and allow to dry for 30 seconds.
- Choose proper strength Loctite threadlocker.
- Apply several drops along the threaded hole and at the bottom of the hole.
- Apply several drops on bolt threads.
- Tighten as required.

Stud in Blind Holes



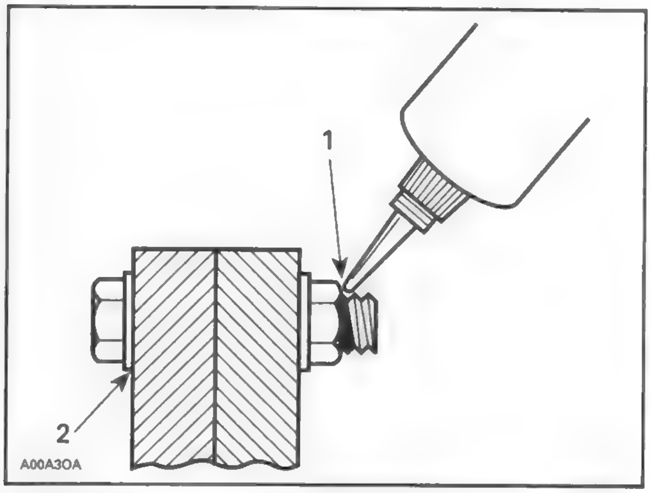
1. *On threads*
2. *On threads and in the hole*
3. *Onto nut threads*

- Clean threads (stud and hole) with solvent.
- Apply Loctite Primer N (P/N 293 800 041) on threads and allow to dry.
- Put 2 or 3 drops of proper strength Loctite threadlocker on female threads and in hole.

NOTE: To avoid a hydro lock situation, do not apply too much Loctite.

- Apply several drops of proper strength Loctite on stud threads.
- Install stud.
- Install cover, etc.
- Apply drops of proper strength Loctite on uncovered threads.
- Tighten nuts as required.

Pre-assembled Parts

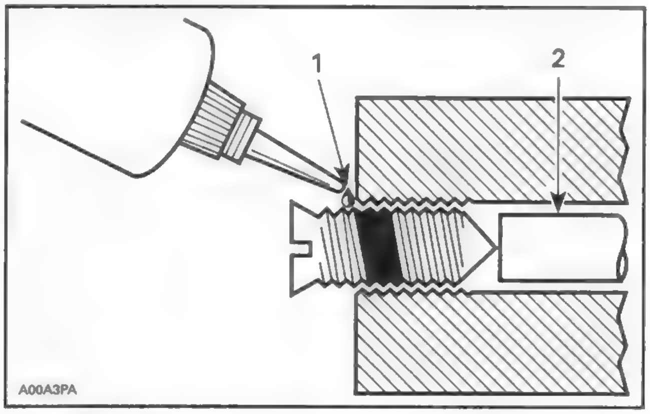


1. *Apply here*
2. *Do not apply*

- Clean bolts and nuts with solvent.
- Assemble components.
- Tighten nuts.
- Apply drops of proper strength Loctite on bolt/nut contact surfaces.
- Avoid touching metal with tip of flask.

NOTE: For preventive maintenance on existing equipment, retighten nuts and apply proper strength Loctite on bolt/nut contact surfaces.

Adjusting Screw

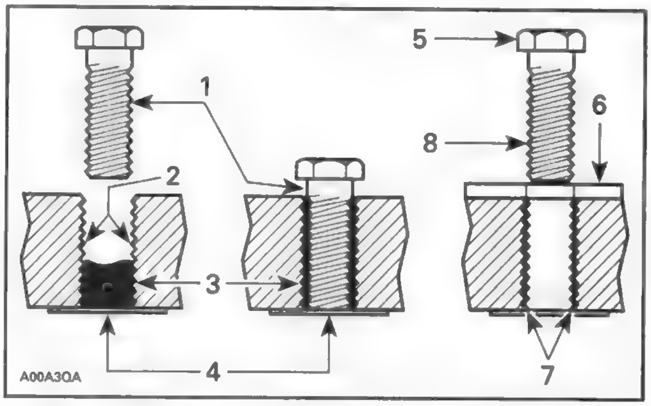


1. *Apply here*
2. *Plunger*

- Adjust screw to proper setting.
- Apply drops of proper strength Loctite threadlocker on screw/body contact surfaces.
- Avoid touching metal with tip of flask.

NOTE: If it is difficult to readjust, heat screw with a soldering iron (232°C (450°F)).

Stripped Thread Repair



1. *Release agent*
2. *Stripped threads*
3. *Form-A-Thread*
4. *Tapes*
5. *Cleaned bolt*
6. *Plate*
7. *New threads*
8. *Threadlocker*

Standard Thread Repair

- Follow instructions on Loctite FORM-A-THREAD 81668 package.
- If a plate is used to align bolt:

a. Apply release agent on mating surfaces.

b. Put waxed paper or similar film on the surfaces.

- Twist bolt when inserting it to improve thread conformation.

NOTE: NOT intended for engine stud repairs.

Repair of Small Holes/Fine Threads

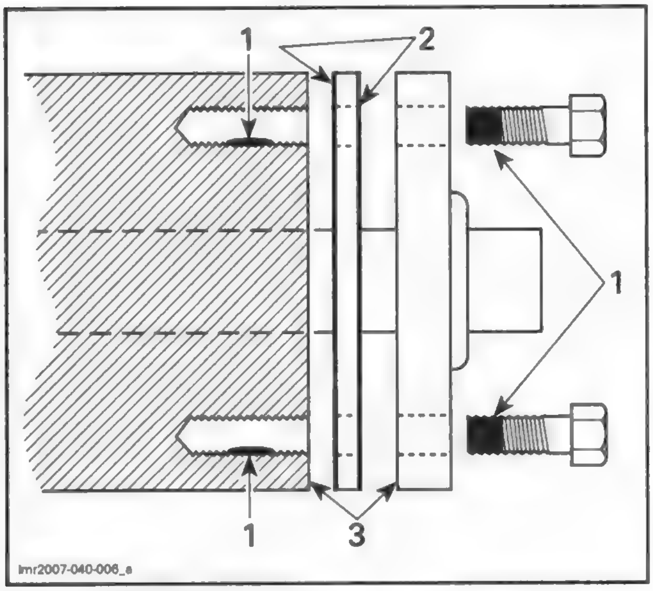
Option 1: Enlarge damaged hole, then follow *STANDARD THREAD REPAIR* procedure.

Option 2: Apply FORM-A-THREAD on the screw and insert in damaged hole.

Permanent Stud Installation (light duty)

- Use a stud or thread on desired length.
- DO NOT apply release agent on stud.
- Do a STANDARD THREAD REPAIR.
- Allow to cure for 30 minutes.
- Assemble.

Gasket Compound



1. Proper strength Loctite
2. Loctite Primer N (P/N 293 800 041) and Gasket Eliminator 518 (P/N 293 800 038) on both sides of gasket
3. Loctite Primer N only

- Remove old gasket and other contaminants with Loctite Chisel remover (P/N 413 708 500). Use a mechanical mean if necessary.

NOTE: Avoid grinding.

- Clean both mating surfaces with solvent.
- Spray Loctite Primer N on both mating surfaces and on both sides of gasket. Allow to dry 1 or 2 minutes.
- Apply GASKET ELIMINATOR 518 (P/N 293 800 038) on both sides of gasket, using a clean applicator.
- Place gasket on mating surfaces and assemble immediately.

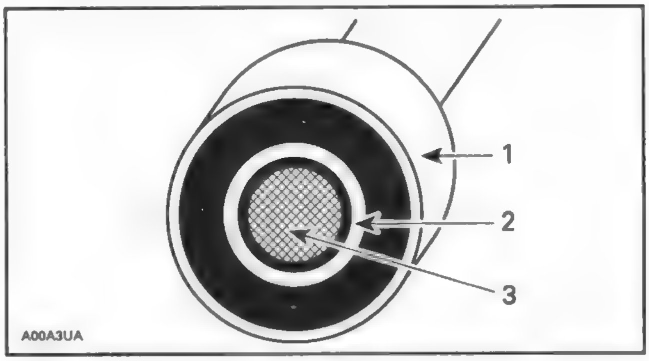
NOTE: If the cover is bolted to blind holes (above), apply proper strength Loctite in the hole and on threads. Tighten.

If holes are sunken, apply proper strength Loctite on bolt threads.

- Tighten as usual.

Mounting on Shaft

Mounting with a Press



1. Bearing
2. Proper strength Loctite
3. Shaft

- Clean shaft external part and element internal part.
- Apply a strip of proper strength Loctite on shaft circumference at insert or engagement point.

NOTE: Retaining compound is always forced out when applied on shaft.

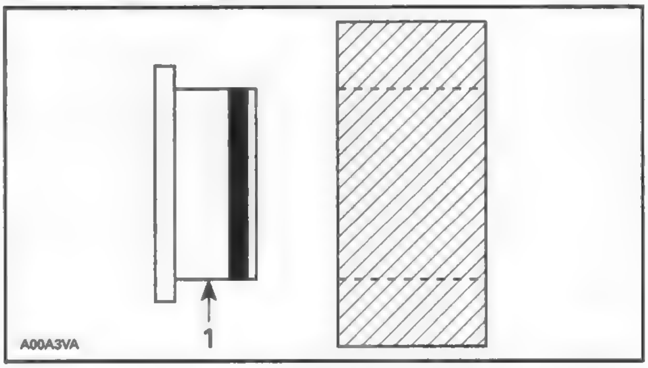
- DO NOT use antiseize Loctite or any similar product.
- No curing period is required.

Mounting in Tandem

1. Apply retaining compound on internal element bore.
2. Continue to assemble as shown above.

Case-In Components

Metallic Gaskets



1. Proper strength Loctite

- Clean inner housing diameter and outer gasket diameter.
- Spray housing and gasket with Loctite Primer N (P/N 293 800 041).
- Apply a strip of proper strength Loctite on leading edge of outer metallic gasket diameter.

NOTE: Any Loctite product can be used here. A low strength liquid is recommended as normal strength and gap are required.

- Install according to standard procedure.
- Wipe off surplus.
- Allow it to cure for 30 minutes.

NOTE: Normally used on worn-out housings to prevent leaking or sliding.

It is generally not necessary to remove gasket compound applied on outer gasket diameter.

MANUAL INFORMATION

The manual is divided into many major sections as you can see in the main table of contents at the beginning of the manual.

Each section is divided in various subsections, and again, each subsection has one or more division.

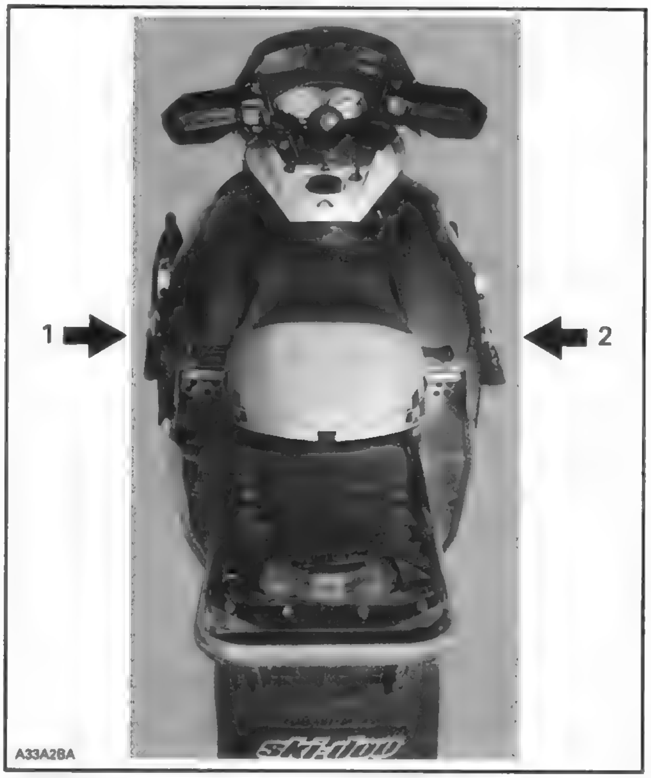
Illustrations and photos show the typical construction of the different assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts shown. However, they represent parts which have the same or a similar function.

CAUTION: Most components of those vehicles are built with parts dimensioned in the metric system. Most fasteners are metric and must not be replaced by customary fasteners or vice-versa. Mismatched or incorrect fasteners could cause damage to the vehicle or possible personal injury.

As many of the procedures in this manual are interrelated, we suggest, that before undertaking any task, you read and thoroughly understand the entire section or subsection in which the procedure is contained.

A number of procedures throughout the book require the use of special tools. Before commencing any procedure, be sure that you have on hand all the tools required, or approved equivalents.

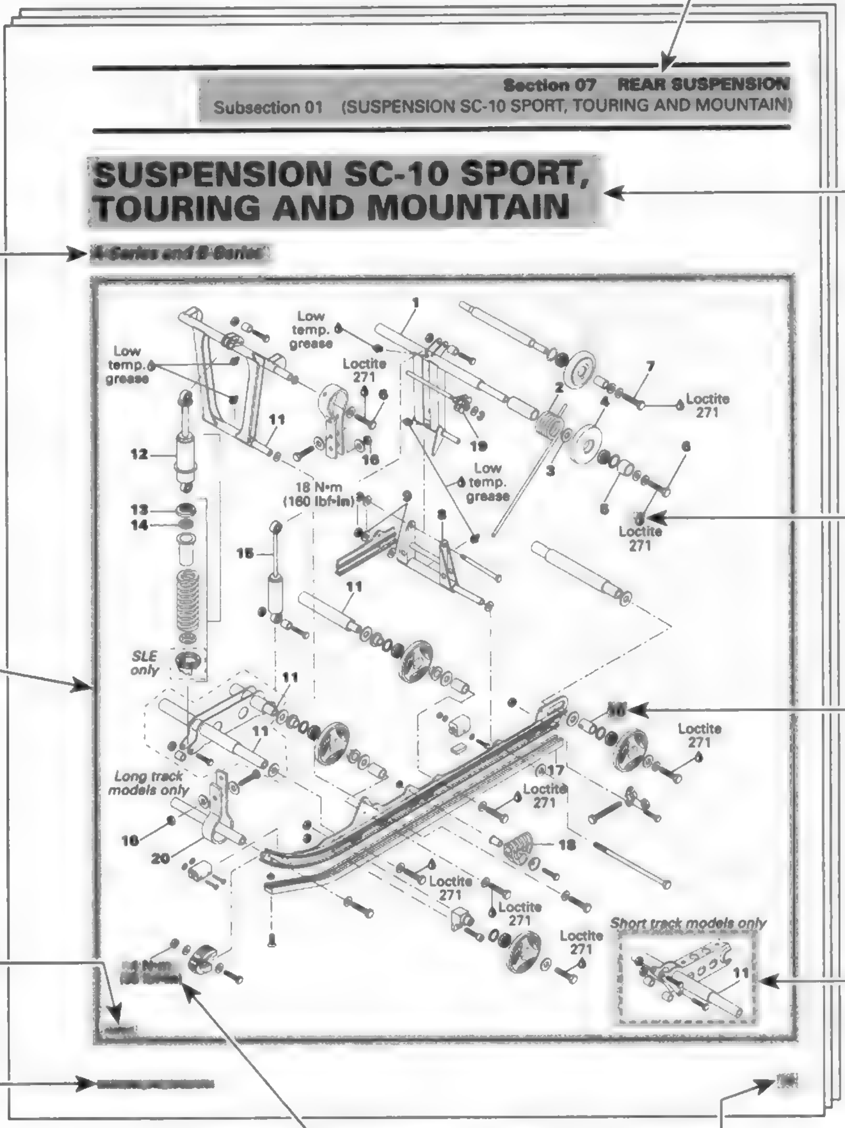
The use of RIGHT and LEFT indications in the text, always refers to driving position (when sitting on vehicle).



TYPICAL
1. Left
2. Right

This *Shop Manual* uses technical terms wich may be slightly different from the ones in the parts catalog.

TYPICAL PAGE



Section 07 **REAR SUSPENSION**
Subsection 01 (SUSPENSION SC-10 SPORT, TOURING AND MOUNTAIN)

SUSPENSION SC-10 SPORT, TOURING AND MOUNTAIN

Low temp. grease
Low temp. grease
Loctite 271
1
7
Loctite 271
2
6
4
11
19
12
16
3
Low temp. grease
6
18 N•m (160 lbf•in)
13
14
9
8
5
Loctite 271
15
11
SLE only
11
10
Loctite 271
11
Long track models only
17
Loctite 271
10
18
20
Loctite 271
Loctite 271
Short track models only
Loctite 271
11

Page heading indicates section and subsection detailed.

Subsection title indicates beginning of the subsection.

Italic subtitle above exploded view indicates pertaining models.

Exploded view assists you in identifying parts and related positions.

Drop represents a service product to be applied to a surface. In this case Loctite 271 to screw threads.

Bold face number indicates special procedure concerning this part.

Illustration number for publishing process.

Dotted box contains parts of a particular model in this case the short track models only.

Document number for publishing process.

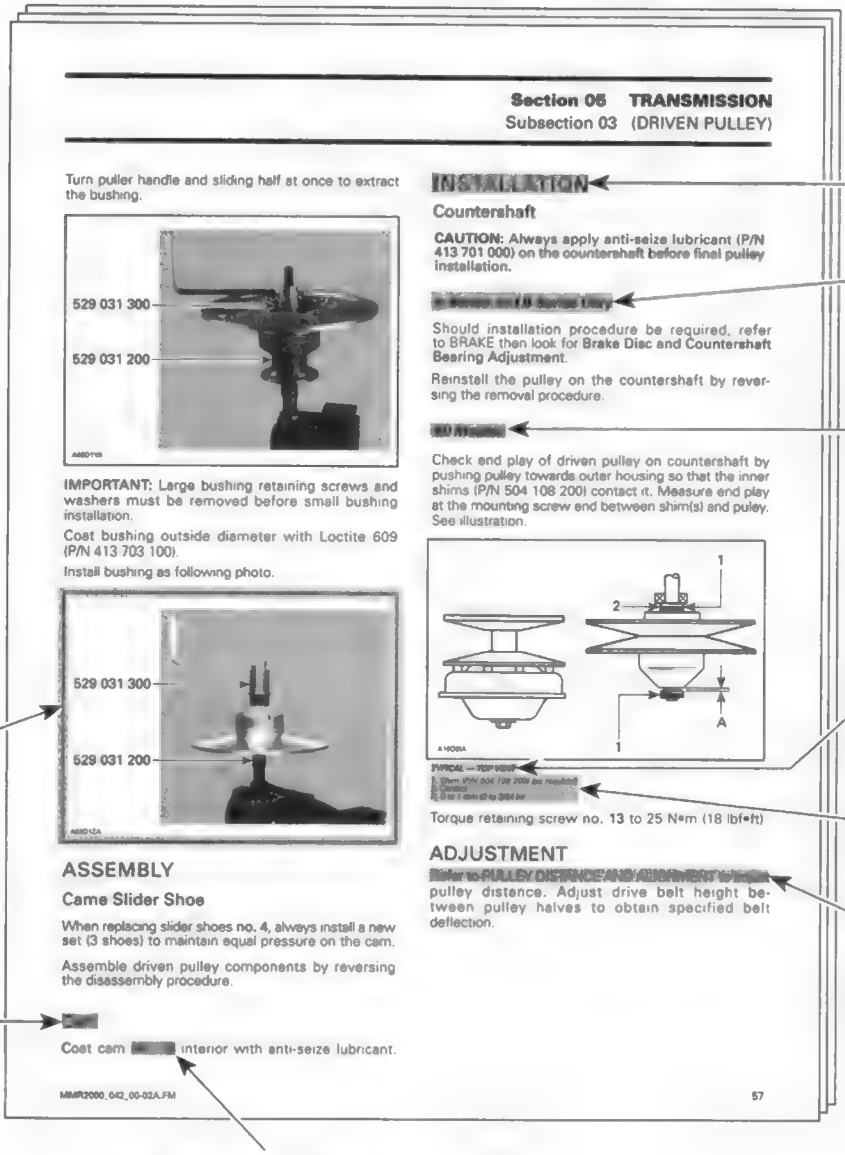
Tightening torque nearby fastener. In this case, nut must be torqued to 4 N•m or 35 lbf•**in**.

Page number

CAUTION: Pay attention to torque specifications. Some of these are in lbf•in instead of lbf•ft. Use appropriate torque wrench.

A00A7XS

TYPICAL PAGE



Section 05 TRANSMISSION
Subsection 03 (DRIVEN PULLEY)

Turn puller handle and sliding half at once to extract the bushing.

529 031 300
529 031 200
A00D1YA

IMPORTANT: Large bushing retaining screws and washers must be removed before small bushing installation.

Coat bushing outside diameter with Loctite 609 (P/N 413 703 100).

Install bushing as following photo.

529 031 300
529 031 200
A00D1ZA

ASSEMBLY

Came Slider Shoe

When replacing slider shoes no. 4, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

Cam

Coat cam [illegible] interior with anti-seize lubricant.

INSTALLATION

Countershaft

CAUTION: Always apply anti-seize lubricant (P/N 413 701 000) on the countershaft before final pulley installation.

[illegible]

Should installation procedure be required, refer to BRAKE then look for **Brake Disc and Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

[illegible]

Check end play of driven pulley on countershaft by pushing pulley towards outer housing so that the inner shims (P/N 504 108 200) contact it. Measure end play at the mounting screw end between shim(s) and puley. See illustration.

TYPICAL — TOP VIEW
1. Shim (P/N 504 108 200) as required
2. Contact
3. 0 to 1 mm (0 to 3/64 in)

Torque retaining screw no. 13 to 25 N•m (18 lbf•ft)

ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT to adjust pulley distance. Adjust drive belt height between pulley halves to obtain specified belt deflection.

MMR2000_042_00-02A.FM 57

Title indicates main procedure to be carried-out.

Italic bold face type setting indicates a particular procedure concerning a model.

Italic bold face setting in this case indicates that particular procedure for A and B-Series is finished, so from this point, all models are concerned.

"TYPICAL" caption indicates a general view which does not represent full detail. "TOP VIEW" caption helps you in understanding illustration.

Call-outs for above illustration.

Reference to look up a certain section and subsection. In this case it concerns pulleys adjustment.

Illustration always follows text to which it pertains.

Subtitle indicates a particular procedure for the named part.

Bold face number following part name refers to exploded view at beginning of subsection.

A00A7YS

MAINTENANCE CHART

A: ADJUST
C: CLEAN
I: INSPECT
L: LUBRICATE
R: REPLACE
T: PROCEED WITH TASK

PART/TASK	10–HOUR OR 500 km (300 mi) INITIAL INSPECTION [1]	MONTHLY OR EVERY 800 km (500 mi)	ONCE A YEAR OR EVERY 3200 km (2000 mi)	EVERY 2 YEARS OR 6000 km (3700 mi)	STORAGE [1]	PRESEASON PREPARATION [1]	REFER TO
ENGINE							
Rewind starter					L,C	I	*REWIND STARTER*
Engine motor mounts	I		I		I		*ENGINE REMOVAL AND INSTALLATION*
Exhaust system	I		I		I		*EXHAUST SYSTEM*
Exhaust manifold screws	I					I	
Cooling system cap, hoses and clamps	I		I			I	*COOLING SYSTEM*
Coolant	I			R			
Crankshaft PTO Seal						I	*BOTTOM END*
RAVE valves			C				*TOP END*
RAVE valves solenoid (SDI and Power TEK)			I				
Air filter		I,C				I,C	*AIR INTAKE SYSTEM*
Injection oil filter				R			*LUBRICATION SYSTEM*
Oil injection pump	A		A			A	
Engine lubrication					T		*STORAGE PROCEDURES*
ENGINE MANAGEMENT SYSTEMS							
Fault Codes	I				I		*MONITORING SYSTEM/FAULT CODES*
FUEL SYSTEM							
Fuel filter				R			*PRESEASON PREPARATION*
Fuel lines, fuel rail and connections	I					T	*FUEL SYSTEM*
Carburetor						A,C	
Throttle	I		I	L		I	
Choke (except SDI)	I		I			I	*FUEL SYSTEM*
Throttle body (SDI)						C	*SEMI-DIRECT INJECTION (SDI)*
Fuel stabilizer [4]					T		*STORAGE PROCEDURES*
ELECTRICAL SYSTEM							
Spark plugs [3]	I	I				R	*IGNITION SYSTEM*
Battery (if so equipped)	I	I			I	I	*CHARGING SYSTEM*
Wiring harnesses and cables	I	I			I		*ELECTRICAL CONNECTORS*

A: ADJUST
C: CLEAN
I: INSPECT
L: LUBRICATE
R: REPLACE
T: PROCEED WITH TASK

PART/TASK	10–HOUR OR 500 km (300 mi) INITIAL INSPECTION (1)	MONTHLY OR EVERY 800 km (500 mi)	ONCE A YEAR OR EVERY 3200 km (2000 mi)	EVERY 2 YEARS OR 6000 km (3700 mi)	STORAGE (1)	PRESEASON PREPARATION (1)	REFER TO
DRIVE/BRAKE SYSTEM							
Drive belt condition	I	I				I	*DRIVE BELT*
Drive belt height adjustment	EVERY BELT REPLACEMENT						
Drive and driven pulleys	I	I	C		I	C	*DRIVE PULLEY* and *DRIVEN PULLEY AND COUNTERSHAFT*
Drive pulley screw (torque)	I		I				*DRIVE PULLEY*
Brake fluid	I	I		R		I	*BRAKE*
Brake hose, pads and disk	I	I				I	
Drive chain tension	A	A			A		*CHAINCASE*
Drive axle end bearing (brake side)					I		*DRIVE AXLE*
Track condition	I	I			I		*TRACK*
Track tension and alignment	A	AS REQUIRED					
Chaincase oil	I				R		*CHAINCASE*
CHASSIS							
Front suspension	I	I			I		*FRONT SUSPENSION*
Rear suspension (2)	I	I,L			I,L		*REAR SUSPENSION*
Suspension stopper strap(s)			I		I		
Steering mechanism	I	I			I		*STEERING SYSTEM*
Skis and runners	I	I			I		

(1) To be performed by an authorized Ski-Doo dealer.

(2) Lubricate whenever the vehicle is used in wet conditions (wet snow, rain, puddles).

(3) Before installing new spark plugs at preseason preparation, it is suggested to burn excess storage oil by starting the engine with the old spark plugs. Only perform this operation in a well-ventilated area.

(4) If vehicle is not intended to be used within one month, add fuel stabilizer in fuel tank to prevent fuel deterioration.

STORAGE PROCEDURES

SERVICE PRODUCTS

Description	Part Number	Page
suspension grease	293 550 033	4
XP-S Lube	293 600 016	4
fuel stabilizer	413 408 600	4
BRP Plastic & Vinyl cleaner	413 711 200	5
storage oil (Canada)	413 711 600	3
storage oil (USA)	413 711 900	3
scratch remover kit	861 774 800	5

GENERAL

Proper snowmobile storage is a necessity during the summer months or when a vehicle is not being used for certain period of time.

If vehicle is not intended to be used within one month, add fuel stabilizer in fuel tank to prevent fuel deterioration. Refer to *FUEL SYSTEM* further in this section.

If vehicle is not intended to be used within three months, refer to storage column from *MAINTENANCE CHART* jointly with the present storage procedures in order to cover each and every aspect of the snowmobile storage procedure. Any worn, broken or damaged parts must be replaced.

⚠ WARNING

Unless otherwise specified, engine should be turned off for storage procedure.

To facilitate the inspection and ensure adequate lubrication of components, it is recommended to clean the entire vehicle.

ENGINE

Rewind Starter

For inspection, cleaning and lubrication, refer to *REWIND STARTER* section.

Engine Motor Mounts

Check if engine supports are cracked or damaged. Replace if necessary.

Check rubber mount on engine supports. Replace them if brittle, cracked or damaged.

Exhaust System

Check and replace if necessary:

- Tuned pipe shields and deflectors for damages
- Tuned pipe ends for cracks or damages
- Manifold for cracks or damages.

Engine Lubrication

CAUTION: Fuel stabilizer should be added prior to engine lubrication to ensure carburetor protection against varnish deposit.

Engine internal parts must be lubricated to protect them from possible rust formation during the storage period.

Proceed as follows:

- Place the vehicle in a well ventilated area and start the engine.
- Start the engine and let it run at idle speed until it reached its operating temperature.
- Stop the engine.
- Remove the primary air intake silencer. Refer to *AIR INTAKE SYSTEM* for the removal procedure.
- Restart engine and run at idle speed.
- Inject storage oil into each carburetor/throttle body until the engine stalls or until a sufficient quantity of oil has entered the engine (approximately half a can).
- With the engine stopped, remove the spark plugs and spray storage oil (Canada) (P/N 413 711 600) or storage oil (USA) (P/N 413 711 900) into each cylinder.
- Crank slowly 2 or 3 revolutions to lubricate cylinders.
- Reinstall the spark plugs and primary air intake silencer.

ENGINE MANAGEMENT SYSTEM

Fault Codes

Using B.U.D.S., verify if fault codes appear in the engine management system (EMS). Repair or replace defective parts.

FUEL SYSTEM

Fuel Stabilizer

It is critical to use the fuel stabilizer (P/N 413 408 600) (250 mL) to prevent fuel deterioration, gum formation and fuel system components corrosion. Follow manufacturer's instructions for proper use.

Pour fuel stabilizer in fuel tank. Fill up fuel tank completely. Ensure there is no water inside fuel tank.

CAUTION: Should any water be trapped inside fuel tank, severe internal damage will occur to the fuel injection system (SDI models).

Do not drain fuel system.

ELECTRICAL SYSTEM

Battery (if so equipped)

Remove battery, clean its tray and surrounding area with water and baking soda.

Inspect, clean and charge battery as explained in *CHARGING SYSTEM* section.

Wiring Harnesses, Cables and Connectors

Inspect for wear, deterioration or damage, replace defective parts if necessary.

DRIVE/BRAKE SYSTEM

Drive and Driven Pulleys

Remove drive belt.

Inspect and clean pulleys.

Spray XP-S Lube (P/N 293 600 016) on sheaves to protect them from rust.

Do not reinstall drive belt.

Drive Axle End Bearing (brake side)

Make a visual inspection of the bearing seal to ensure it is not damaged. Replace bearing if damaged. Refer to *DRIVE AXLE*.

Track

NOTE: Do not release track tension.

Visually inspect track for:

- Cuts and abnormal wear
- Broken rods
- Broken or missing track cleats.

If track is damaged or rods are broken, replace track, refer to *TRACK* section.

For damaged or missing cleats, refer to *TRACK* section for procedure.

Chaincase

Chaincase Oil

Replace chaincase oil, refer to *CHAINCASE* section.

Drive Chain

Check drive chain tension and adjust if necessary, refer to *CHAINCASE* section.

CHASSIS

Front Suspension

Inspect the front suspension arms for wear or damages, replace if necessary. Refer to *FRONT SUSPENSION* section.

Rear Suspension

Inspect rear suspension components for wear, deterioration or damage, replace defective parts if necessary.

Inspect strap(s) for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace if necessary.

Lubricate rear arm at grease fittings using suspension grease (P/N 293 550 033).

Steering Mechanism

Lubricate the steering mechanism if needed. **Inspect all components for tightness.**

Skis and Runners

Inspect skis and runners for wear, deterioration or damage, replace if necessary.

VEHICLE

Vehicle Cleaning

Keep engine compartment clean of grass, twigs, cloth, etc. These are combustible under certain conditions.

To clean the vehicle, do not use high pressure washers (like the ones found in car washes) as it may damage certain parts of the vehicle.

To clean the vehicle, proceed as follows:

Rinse the vehicle thoroughly with water to remove loose dirt.

Using a soft clean cloth, wash the vehicle with water mixed with a mild detergent, such as soap specially formulated for motorcycles or automobiles.

While washing the vehicle, check for grease or oil. If necessary, use BRP Plastic & Vinyl cleaner (P/N 413 711 200) or a mild automotive degreaser. Follow thoroughly the manufacturer's instructions.

CAUTION: Do not use heavy duty cleaner on decals or vinyl.

Dry the vehicle with a chamois or a soft towel.

⚠ WARNING

Do not apply a vinyl or plastic protector on the seat as the surface will become slippery and the operator or the passenger may slip off the vehicle.

Windshield Polishing

Windshield can be polished using scratch remover kit (P/N 861 774 800) or a plastic cleaner specially formulated for these special surfaces.

CAUTION: Do not clean the windshield with alkaline or acid cleaner, gasoline or solvent to avoid windshield damage.

Vehicle Waxing

Apply only nonabrasive wax safe for clearcoats paints on glossy finishes.

Avoid applying wax on mat surfaces.

Vehicle Protection

Block air intake and muffler with clean rags.

Touch up all metal spots where paint has been scratched off.

Cover the vehicle with a permeable material. Avoid using plastic or similar non-breathing, coated materials that restrict air flow and allow heat and moisture to accumulate.

Store vehicle in a dry unheated area, away from sunlight, with a small amount of daily temperature variation.

Lift rear of vehicle until track is clear of the ground. Install on a snowmobile mechanical stand.

PRESEASON PREPARATION

SERVICE PRODUCTS

Description	Part Number	Page
pulley flange cleaner	413 711 809	7–8

GENERAL

Proper vehicle preparation is necessary after the summer months or when a vehicle has not been used for more than three months.

Refer to preseason preparation column from *MAINTENANCE CHART* jointly with the present preseason preparation procedures in order to cover each and every aspect of the snowmobile preseason preparation procedure.

Any worn, broken or damaged parts found during the storage procedure should have been replaced. If not, proceed with the replacement.

⚠ WARNING

Unless otherwise specified, engine should be turned off for preparation procedure.

ENGINE

Rewind Starter

Check if rope is fraying, replace if so.

When pulling starter grip, it must return freely. If not, check for damaged parts or lack of lubrication. Replace parts or lubricate accordingly.

Exhaust Manifold

Check exhaust manifold screws for looseness. Retorque if necessary.

Muffler

Remove rags that were installed during storage preparation.

Cooling System

Inspect cooling system for leaks, to perform a cooling system leak test, refer to *COOLING SYSTEM*.

Check coolant level in coolant reservoir. Add coolant if necessary.

If engine is cold, refill up to 15 mm (5/8 in) over COLD level line.

If engine is hot, refill up to 25 mm (1 in) over COLD level line. Use caution when opening pressurized coolant reservoir cap. Place a rag over cap and turn it slowly to release pressure.

Crankshaft PTO Seal

Make sure there is no grease coming out from crankshaft PTO seal, if so replace seal. Refer to *BOTTOM END* section.

Air Filter

Ensure that air filter is properly installed and in good condition.

Rinse filter with fresh water to clean or replace if damaged.

Oil Injection Pump

Make sure oil injection pump is properly adjusted, refer to *LUBRICATION SYSTEM*.

FUEL SYSTEM

Inspect fuel system for leaks. Perform a fuel system leak test, refer to *FUEL TANK AND FUEL PUMP*.

Carburetors

All Models except 600 HO SDI

Disassemble carburetors in order to clean all internal parts. Do not hesitate to replace any jets having gum or varnish on their surfaces.

NOTE: Cleaning is not required if vehicle was prepared as per storage procedures.

Make sure carburetors are properly adjusted, refer to *FUEL SYSTEM*.

Throttle Body

600 HO SDI Models

Using the pulley flange cleaner (P/N 413 711 809), clean the throttle plates and throttle body bores.

NOTE: To ease cleaning, throttle body should be partially pulled from engine, without disconnecting throttle cable or coolant hose.

CAUTION: Ensure the cleaner does not enter engine intake.

Throttle

Make sure that throttle lever operates freely, adjust and lubricate throttle cable as required, refer to *FUEL SYSTEM*.

Choke (except 600 HO SDI)

Make sure choke lever operates freely, adjust and lubricate choke cable as required. Refer to *FUEL SYSTEM*.

ELECTRICAL SYSTEM

Spark Plugs

Once preseason preparation is done, start engine with the old spark plugs to burn excess storage oil. Then, install new spark plugs.

NOTE: Ensure to replace with recommended spark plugs.

Battery (if so equipped)

Verify that battery is fully charged, if not, refer to the appropriate charging procedure in *CHARGING SYSTEM*.

DRIVE/BRAKE SYSTEM

Drive and Driven Pulley

Clean drive and driven pulleys sheaves with pulley flange cleaner (P/N 413 711 809).

Drive Belt

Inspect belt for cracks, fraying or abnormal wear. Replace if necessary.

Make sure to install the proper belt with arrow printed on belt pointing front of vehicle.

Brake

Brake Fluid

Check brake fluid in reservoir for proper level. Add fluid (DOT 4) as required.

CAUTION: Use only DOT 4 brake fluid from a sealed container. An opened container may be contaminated or may have absorbed moisture from the air.

Brake Hose, Pads and Disk

Inspect brake hose for wear, deterioration or damage, replace if necessary.

Inspect brake pads for proper thickness. Refer to *BRAKE*.

Remove any rust built-up on braking surfaces. Clean brake disk braking surfaces with pulley flange cleaner (P/N 413 711 809).

Track

Verify track tension and alignment, refer to *TRACK*.

NOTE: Track tension and alignment are interrelated. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

TECHNICAL GUIDELINES

The following chart is provided to help diagnose the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

ENGINE

Symptom: ENGINE BACKFIRES

1. **Check spark plugs.**
   - *Defective spark plug(s). Install new recommended spark plug(s).*
2. **Check ignition timing.**
   - *Timing is too advanced. Set timing according to specifications (refer to TECHNICAL SPECIFICATIONS).*
3. **Check for erratic sparks.**
   - *Poor electrical connections. Repair.*
   - *Faulty ignition component. Replace defective part.*
4. **Check carburetors.**
   - *Fuel passages obstructed. Clean carburetor and install new strainer.*

Symptom: ENGINE SUDDENLY TURNS OFF AT HIGH RPM

1. **Check spark plugs.**
   - *Non-resistor type spark plugs installed.*
2. **Check ECM ground.**
   - *Loose or corroded ground.*
3. **Check fuel pump.**
   - *Defective fuel pump or restricted fuel line or vent.*

Symptom: ENGINE SUDDENLY TURNS OFF

1. **Perform engine leak test. Refer to *ENGINE LEAK TEST*.**
   - *Damaged gasket and/or seal. Replace defective parts.*
2. **"Four-corner" seizure of piston(s).**
   - *High acceleration when engine is cold. Piston expands faster than cylinder. Replace piston(s). Ask driver to refer to the VEHICLE WARM-UP PROCEDURE in the OPERATOR'S GUIDE.*

Symptom: **ENGINE SUDDENLY TURNS OFF** (cont'd)

3. **Piston(s) seizure on exhaust side (color on piston dome is correct).**
   - *Kinked fuel tank vent tube. Relocate fuel tank vent tube.*
   - *Leaks at fuel line connections or damaged fuel lines. Replace defective lines.*
   - *Fuel does not flow through carburetor(s) (foreign particles in needle area and/or varnish formation in carburetor(s)). Clean carburetor(s) and install new strainer or filter.*
   - *Spark plug heat range is too warm. Install spark plugs with appropriate heat range (refer to TECHNICAL SPECIFICATIONS).*
   - *Improper ignition timing. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
   - *Restriction in exhaust system. Replace.*
   - *Compression ratio is too high. Install genuine parts.*
   - *Too low fuel octane number. Use proper fuel octane number.*
   - *Carburetor calibration is too lean. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
   - *Improper reed valve adjustment or damage. Adjust according to specifications (refer to appropriate ENGINE subsection) and/or install BRPs recommended reed valve.*
   - *Poor quality oil. Use proper BRP XP-S injection oil.*
   - *Leaks at air intake silencer. Replace air intake silencer grommets.*
   - *Excessive wear of piston rings. Replace piston rings.*
4. **Melted and/or perforated piston dome; melted section at ring end gap.**
   - *When piston reaches TDC, mixture is ignited by heated areas in combustion chamber. This is due to an incomplete combustion of a poor quality oil. Clean residue accumulation in combustion chamber and replace piston(s). Use proper BRP XP-S injection oil.*
   - *Spark plug heat range is too high. Install recommended spark plugs (refer to TECHNICAL SPECIFICATIONS).*
   - *Ignition timing is too advanced. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
   - *Inadequate fuel quality. Use appropriate fuel.*
   - *Carburetion is too lean. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
5. **Seized piston all around the circumference (dry surface).**
   - *Lack of oil, damaged oil line or defective injection pump. Replace defective part(s).*
6. **Grooves on intake side of piston only.**
   - *Oil film eliminated by water (snow infiltration in engine). This can also be caused by running engine on choke for too long. Excessive fuel will remove the oil film on the piston and make marks. Replace piston(s) and check if intake system leaks.*
7. **Piston color is dark due to seizure on intake and exhaust sides.**
   - *Cooling system leaks and lowers coolant level. Proceed with a leakage test (refer to COOLING SYSTEM) and repair as required. Add coolant in cooling system until appropriate level is reached.*
   - *Accumulation of foreign particles in needle valve and/or main jet area. Clean carburetor(s).*
8. **Cracked or broken piston(s).**
   - *Cracked or broken piston(s) due to excessive piston/cylinder clearance or engine over-revving. Check piston/cylinder clearance (refer to TOP END). Replace piston(s).*
   - *Adjust drive pulley according to specifications (refer to TECHNICAL SPECIFICATIONS) and/or clean pulley sheaves if they are contaminated with greasy particles.*
9. **DPM manifold air vent is obstructed.**
   - *Carburetion is too lean. Ensure proper air vent.*

Symptom: PISTON RING AND CYLINDER SURFACES ARE SCRATCHED

1. **Check oil quality.**
   - *Poor quality oil. Use proper BRP XP-S injection oil.*
2. **Check injection pump and its hoses.**
   - *Inadequate injection pump adjustment and/or defective hoses. Adjust pump according to specifications (refer to LUBRICATION SYSTEM) and/or replace hoses.*

Symptom: ENGINE DOES NOT OFFER MAXIMUM POWER AND/OR DOES NOT REACH MAXIMUM OPERATING RPM

1. **Check spark plug condition.**
   - *Fouled spark plugs. Replace.*
2. **Check if there is water in fuel.**
   - *There is water in fuel. Drain fuel system, then fill with appropriate fuel.*
3. **Check proper operation of RAVE valves.**
   - *Refer to ENGINE DOES NOT REACH ITS FULL OPERATING RPM (500 TO 1000 RPM LOWER). Repair.*
4. **Check items listed in *ENGINE RUNS OUT OF FUEL* (refer to *FUEL AND OIL SYSTEMS* subsection).**
5. **Check carburetor adjustments and cleanliness.**
   - *Inadequate carburetor adjustments or dirt accumulation. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS) or clean.*
6. **Check drive belt.**
   - *Worn belt. Replace belt if width is 3 mm (1/8 in) less than nominal dimension (refer to TECHNICAL SPECIFICATIONS).*
7. **Check track adjustment.**
   - *Too much tension and/or improper alignment. Align track and adjust its tension to specifications (refer to TECHNICAL SPECIFICATIONS).*
8. **Check drive pulley.**
   - *Improper calibration screw adjustments (TRA pulley) and/or worn bushing(s). Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS) and/or replace bushing(s).*
9. **Check driven pulley.**
   - *Worn bushing and/or spring tension. Replace spring and/or adjust its tension according to specifications (refer to TECHNICAL SPECIFICATIONS).*
10. **Check exhaust system.**
    - *Restriction or exhaust system leakage. Replace or reseal with Loctite 5920 RTV high temperature sealant (P/N 293 800 090).*
11. **Check ignition timing.**
    - *Decrease in power due to delayed ignition. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
12. **Check engine compression.**
    - *Worn piston(s) and ring(s). Replace.*
13. **Check reed valve.**
    - *Improper tightness and/or opening. Replace or adjust. (Refer to proper ENGINE subsection).*

Symptom: ENGINE DETONATION AT MAXIMUM RPM

1. **Check which type of fuel is used.**
   - *Octane number is too low and/or alcohol level is too high. Use recommended fuel type.*
2. **Check spark plug type.**
   - *Improper spark plug heat range. Install recommended spark plugs (refer to TECHNICAL SPECIFICATIONS).*
3. **Check exhaust system.**
   - *Too much restriction. Replace.*
4. **Check ignition timing.**
   - *Timing is too advanced. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
5. **Check if engine is overheating. (Refer to *HIGH ENGINE OPERATING TEMPERATURE*.)**
6. **Check carburetion.**
   - *Fouled and/or improper carburetor components. Clean or replace according to specifications (refer to TECHNICAL SPECIFICATIONS).*
7. **Check combustion chamber volume.**
   - *Compression ratio is too high. Install genuine parts.*

Symptom: ENGINE TURNS OVER BUT FAILS TO START

1. **Check switches.**
   - *Engine cut-out switch is in OFF position or tether cord cap (DESS key) away from post. Place engine cut-out switch in the ON position and install tether cord cap (DESS key) on post. If it still does not work, connect DESS switch BK/GN and BK/WH wires together (harness side).*
2. **Check fuel level.**
   - *Mixture too lean to start cold engine. Check fuel tank level and use choke.*
3. **Check spark plug.**
   - *Defective spark plug (no spark). Replace spark plugs.*
4. **Check fuel lines.**
   - *No fuel to the engine (spark plugs dry when removed). Check fuel tank level; check fuel filter and strainer, replace if clogged; check condition of fuel and impulse lines and their connections.*
5. **Check engine compression.**
   - *Insufficient engine compression. Replace defective part(s) (e.g.: piston(s), ring(s), etc.).*

Symptom: IRREGULAR ENGINE IDLE (normal use after engine warm up)

1. **Check choke.**
   - *Choke plunger may be partially opened. Readjust.*
2. **Check carburetor adapter(s)**
   - *Air enters through a crack. Replace.*
3. **Check air screw position.**
   - *Inadequate fuel/air mixture. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
4. **Check reed valve.**
   - *Improper tightness and/or opening. Replace or adjust. Refer to proper ENGINE subsection.*
5. **Perform engine leak test.**
   - *Leaking gaskets allow air to enter in engine. Replace defective parts.*

Symptom: IRREGULAR ENGINE IDLE (normal use after engine warm up) (cont'd)

6. **DPM manifold air vent is obstructed.**
   - *Carburetion is too lean. Ensure proper air vent.*
7. **On models with carburetors, check throttle slide height.**
   - *Incorrect throttle slide height. Readjust according to specifications.*
8. **On SDI models, check cleanness of throttle body.**
   - *Deposits inside throttle body. Clean throttle body bores and plates.*

Symptom: HIGH ENGINE OPERATING TEMPERATURE

1. **Check coolant level and check if there is air infiltration in the system or if there are leaks in gasket areas.**
   - *Low coolant level or air in system. Add coolant until recommended level is reached, bleed system and/or tighten clamps.*
2. **Check temperature gauge sensor.**
   - *False reading. Check terminal connections. If problem persists, replace sensor.*
3. **Check if heat exchangers are clean.**
   - *Dirty heat exchangers. Clean heat exchangers.*
4. **Check if coolant flows through system properly.**
   - *Foreign particles and/or broken coolant pump impeller. Clean cooling system and/or replace coolant pump impeller.*
5. **Check antifreeze concentration.**
   - *Antifreeze concentration is too high. Adjust concentration according to BRP's recommendations.*
6. **Check thermostat.**
   - *Thermostat reacts slowly or not at all. Replace.*
7. **Check tank cap.**
   - *Cap does not hold pressure. Replace.*
8. **Check condition and heat range of spark plugs.**
   - *Melted spark plug tip or inadequate heat range. Replace.*
9. **Check carburetion.**
   - *Improperly adjusted or inadequate carburetor components. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS) or replace inadequate component(s).*
10. **Check ignition timing.**
    - *Ignition timing is too advanced. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
11. **Check cylinder head gaskets.**
    - *Worn gaskets. Replace.*

Symptom: ENGINE DOES NOT REACH ITS FULL OPERATING RPM (500 to 1000 RPM slower)

1. **Check RAVE valve pistons.**
   - *Valve piston(s) is (are) not screwed to the bottom. Screw valve piston(s) to bottom.*
2. **Check that valve moves freely.**
   - *Valve stuck in closed position. Clean.*
3. **Check RAVE valve stems.**
   - *Bent RAVE valve stem(s). Replace.*

Symptom: **ENGINE DOES NOT REACH ITS FULL OPERATING RPM (500 to 1000 RPM slower)** (cont'd)

4. **Check RAVE valves.**
   - *Jammed valve(s). Clean.*
5. **Check RAVE pressure holes (except SDI and Power TEK).**
   - *Clogged holes. Clean.*
6. **Check clamps or sleeves.**
   - *Damaged clamp(s) or sleeve(s). Replace.*

Symptom: **ENGINE PINGING**

1. **Check for proper fuel octane number according to engine type.**
   - *Too low fuel octane number. Use appropriate fuel octane number (Refer to TECHNICAL SPECIFICATIONS).*
2. **Check fuel lines.**
   - *Bent fuel lines (preventing fuel from flowing through). Relocate or replace fuel lines.*
3. **Check if carburetors are clean.**
   - *Dirt prevents fuel from flowing through. Clean.*
4. **Check ignition timing.**
   - *Timing is too advanced. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
5. **Check compression ratio.**
   - *Compression ratio is too high. Replace inadequate part(s) to obtain manufacturer's recommended compression ratio or use a higher grade fuel.*
6. **Check for carbon accumulation in combustion chamber and/or on piston dome.**
   - *Carbon accumulation. Remove carbon accumulation.*

FUEL AND OIL SYSTEMS

Symptom: **HIGH FUEL CONSUMPTION OR RICH MIXTURE (except SDI models)**

1. **Check choke adjustment.**
   - *Fuel flows through choke circuit while engine runs. Readjust choke.*
2. **Check needle valve on each carburetor.**
   - *Foreign particles prevent needle valve from closing and/or pounded seating area. Clean or replace needle valve, then clean seating area.*

Symptom: **FUEL LEAKS IN ENGINE BASE WHEN ENGINE IS STOPPED (except SDI models)**

1. **Check needle valve on each carburetor.**
   - *Foreign particles prevent needle valve from closing and/or pounded seating area. Clean or replace needle valve, then clean seating area.*
2. **Check fuel pump diaphragm.**
   - *Cracked diaphragm. Replace.*

Symptom: ENGINE LACKS POWER OR STALLS AT HIGH RPM (except SDI models)

1. **Check fuel tank vent hose.**
   - *Kinked or clogged hose. Relocate or replace.*
2. **Check in-tank fuel strainer.**
   - *Clogged filter. Replace.*
3. **Check fuel lines.**
   - *Kinked or clogged lines. Relocate or replace.*
4. **Check fuel pump flow.**
   - *Check impulse hose. Replace.*
   - *Dried diaphragm. Replace.*
5. **Check if carburetors are clean.**
   - *Varnish. Clean.*

Symptom: HIGH INJECTION OIL CONSUMPTION

1. **Check oil injection pump adjustment.**
   - *Oil injection pump adjusted too rich. Adjust.*
2. **Check injection oil lines and their fitting.**
   - *Leaking lines and/or cover. Replace defective part(s).*
3. **Check injection pump cover gasket.**
   - *Broken gasket. Replace.*
4. **Check nipple check valve.**
   - *Check valve stuck open. Replace.*
5. **Check pump.**
   - *Defective pump. Replace pump.*
6. **Test pump shaft gear reservoir for leaks.**
   - *Leaking seal(s). Replace seal(s).*

Symptom: ENGINE LACKS FUEL (SDI models only)

1. **Check in-line fuel filter.**
   - *Clogged filter. Replace fuel strainer or filter.*
2. **Check electric fuel pump pressure.**
   - *Electric fuel pump defective. Replace.*
   - *Regulator defective. Replace.*
3. **Check fuel injectors flow.**
   - *Dirty or defective injectors. Replace.*

Symptom: ENGINE IS TOO RICH OR TOO LEAN (models with DPM system only)

1. **Check electrical connections of DPM solenoid.**
   - *Corroded terminals. Clean or replace.*
2. **Check for DPM manifold leaking.**
   - *DPM manifold is leaking. Repair or replace.*

DRIVE SYSTEM

Symptom: THE SNOWMOBILE ACCELERATES SLOWLY, ESPECIALLY FROM A STANDING START

1. **Check drive belt condition.**
   - *Belt is too narrow (drive belt engagement is higher in drive pulley). Replace belt if width is less than specified in DRIVE BELT.*
2. **Check drive belt deflection.**
   - *Deflection is too high (drive belt engagement is higher in drive pulley). Adjust drive belt height according to specifications (refer to DRIVE BELT).*
3. **Check if driven pulley sliding sheave slides freely.**
   - *Jammed sliding sheave. Replace.*
4. **Check spring tension of driven pulley sliding sheave.**
   - *Sliding sheave rotation is accelerated when spring tension is too weak. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS) or replace.*
5. **Check drive pulley spring tension.**
   - *Spring tension is too weak. Replace.*

Symptom: ENGINE MAXIMUM RPM IS TOO HIGH AND TOP SPEED IS NOT REACHED

1. **Check items 1, 2 and 3 of THE SNOWMOBILE ACCELERATES SLOWLY, ESPECIALLY FROM A STANDING START.**
2. **Check driven pulley spring tension.**
   - *Spring tension is too stiff. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
3. **Check position of the calibration screws. (TRA drive pulley).**
   - *Selected numbers are too high. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS) or replace spring.*
4. **Check the driven pulley.**
   - *Driven pulley does not open completely. Clean, readjust or replace driven pulley.*
5. **Check if levers of drive pulley move freely.**
   - *Stuck levers. Replace lever bushings.*

Symptom: LOOSE IN DRIVE SYSTEM WHEN ACCELERATING/DECELERATING

1. **Check drive chain tension.**
   - *Drive chain is too loose. Adjust.*

Symptom: PULLEYS DO NOT DOWN SHIFT PROPERLY

1. **Check drive pulley bushings (cleanliness, wear, etc.).**
   - *Bushings stick to fixed sheave pulley shaft. Clean or replace.*

Symptom: BELT TOO NARROW ON ONE SECTION

1. **Vehicle started with a frozen track.**
   - *Free track from ice before starting vehicle.*
2. **Vehicle ridden with parking brake engaged.**
   - *Release parking brake before riding vehicle.*
3. **Check track tension/alignment.**
   - *Track too tight. Adjust track tension and alignment.*

Symptom: BELT TOO NARROW ON ONE SECTION (cont'd)

4. **Check drive pulley.**
   - *Drive pulley does not operate properly. Repair or replace drive pulley.*
5. **Check belt height.**
   - *Belt height is incorrect. Adjust according to specifications.*

Symptom: BELT GLAZED EXCESSIVELY OR HAVING BAKED APPEARANCE

1. **Check if drive pulley bushings are worn.**
   - *Slipping due to insufficient pressure on belt sides. Replace bushing.*
2. **Check condition of drive pulley fixed sheave shaft.**
   - *Slipping due to rusted drive or driven pulley shafts. Clean shaft with fine steel wool.*
3. **Check if pulley sheaves are clean.**
   - *Slipping due to oily pulley surfaces. Clean pulley sheaves.*
4. **Check pulley calibration.**
   - *Slipping due to improper pulley calibration. Calibrate according to specifications.*

Symptom: BELT WORN EXCESSIVELY IN TOP WIDTH

1. **Check drive pulley.**
   - *Excessive slippage due to jamming of drive pulley. Inspect drive pulley.*
2. **Check drive belt identification number.**
   - *Improper belt angle (wrong type of belt). Replace belt with an appropriate drive belt.*
3. **Check drive belt width.**
   - *Considerable use. Replace belt if less than specified in DRIVE BELT.*

Symptom: BELT SIDES WORN CONCAVE

1. **Check pulley sheave surfaces.**
   - *Rough or scratched pulley sheave surfaces. Repair or replace.*
2. **Check drive belt identification number.**
   - *Wrong belt. Replace with an appropriate drive belt (refer to TECHNICAL SPECIFICATIONS).*

Symptom: FATIGUE CRACKS BETWEEN COGS

1. **Check drive belt condition.**
   - *Belt considerably worn, worn out. Replace.*
   - *Distortion of natural belt shape due to improper storage. Store properly.*

Symptom: TOOTH CHUNK OUT

1. **Check drive belt rotational direction.**
   - *Improper belt installation. Replace.*
2. **Check if drive belt rubs against components.**
   - *Belt rubs against fixed components. Relocate components.*
3. **Check drive pulley.**
   - *Violent engagement of drive pulley. Check drive pulley engagement speed, drive pulley bushings and components.*
4. **Check drive belt storage condition.**
   - *Improper storage procedure (excessive bend or twist).*

Symptom: **NOISE OR VIBRATION COMING FROM THE TRACK**

1. **Check track tension.**
   - *Track is too loose. Adjust to recommended tension.*
2. **Check condition of idler wheel(s).**
   - *Idler wheel rubber is damaged. Replace.*
3. **Check guide cleats.**
   - *Top portion of guide cleat(s) is bent. Replace.*
4. **Check sprockets.**
   - *One or several teeth of drive shaft sprockets are broken. Replace sprocket(s).*
5. **Check track rods and/or internal traction teeth.**
   - *One or several track rods and/or teeth are broken. Replace track.*

BRAKE SYSTEM

Symptom: **SPONGY BRAKE CONDITION**

1. **Brake pads worn.**
   - *Replace brake pads.*
2. **Air in brake system.**
   - *Bleed system.*
3. **Contaminated brake fluid.**
   - *Replace brake fluid and bleed system.*
4. **Leak in brake system.**
   - *Repair leak.*
5. **Master cylinder faulty.**
   - *Replace master cylinder.*
6. **Caliper piston seals worn or damaged.**
   - *Replace caliper.*

REAR SUSPENSION

Symptom: **SLIDER SHOES WEAR OUT PREMATURELY/OR TRACK CLEATS BECOME BLUE**

1. **Check track tension.**
   - *Pressure is too great on slider shoes. Adjust according to specifications (refer to TRACK). Replace defective parts.*
2. **Check idler wheel condition.**
   - *Stuck bearing, flat spot on wheel or damaged wheel. Replace defective parts.*
   - *Idler wheels too small for minimal snow or icy condition. Install bigger idle wheels.*
3. **Check snow conditions or lack of snow.**
   - *Lack of lubrication of slider shoes. Ask driver to ride in appropriate snow conditions (see OPERATOR'S GUIDE).*
4. **Check slider shoes and/or suspension retaining screws.**
   - *Twisted slider shoes or loose retaining screws. Replace defective parts and/or tighten loose screws.*

Symptom: **TRACK OVERHEATS OR SHOWS EXCESSIVE WEAR**

1. **Check track profiles.**
   - *Hi profile tracks is used on trails. Change track for smaller profile.*
2. **Check track width.**
   - *Track width exceeds 38 cm (15 in). Replace track.*

ELECTRICAL SYSTEM

Symptom: **ENGINE IS MISFIRING — ERRATIC SPARK AT SPARK PLUG**

1. **Check spark plugs. Proceed with spark plug analysis in order to identify source of problem.**
   - *Defective and/or worn spark plug(s) and/or cable(s) and/or cap(s). Replace defective part(s). Proceed with ignition system testing procedures.*

Symptom: **FOULED (BLACK) SPARK PLUG TIP**

1. **Check carburetors.**
   - *Carburetion is too rich. Adjust according to specifications (refer to TECHNICAL SPECIFICATIONS).*
2. **Check injection oil consumption.**
   - *Injection pump flow is too high. Adjust according to specifications or replace.*
3. **Check oil quality.**
   - *Poor quality oil (creation of deposits). Use appropriate BRP XP-S injection oil.*
4. **Check engine compression.**
   - *Leaking piston ring(s). Replace.*

Symptom: **SPARK PLUG TIP IS LIGHT GRAY**

1. **Refer to *ENGINE SLOWS DOWN OR STOPS AT HIGH RPM* and check items listed.**
2. **Check spark plug heat range.**
   - *Spark plug heat range is too high. Replace by BRP's recommended spark plug (refer to TECHNICAL SPECIFICATIONS).*
3. **Check if air intake silencer leaks.**
   - *Air surplus coming from opening(s) located between halves. Seal.*
4. **Check carburetor adapter collars.**
   - *Loose collar(s). Tighten.*
5. **Check carburetor adapter(s).**
   - *Cracked or deformed adapter(s). Replace.*
6. **Check if primary compression leaks.**
   - *Primary compression leaks. Perform leak down test and repair as necessary.*

Symptom: **RER (Rotax Electronic Reverse) DOES NOT WORK**

1. **Check idle speed.**
   - *Wrong idle speed. Adjust according to specification (refer to TECHNICAL SPECIFICATIONS).*
2. **Check spark plug.**
   - *Faulty spark plug. Replace.*
3. **Check engine compression.**
   - *Too low engine compression; engine stalls when pushing RER button. Rebuilt the engine.*

Symptom: RER (Rotax Electronic Reverse) DOES NOT WORK (cont'd)

4. **Check drive belt height.**
   - *Wrong belt height. Adjust according to specification (refer to DRIVE BELT).*
5. **Check START/RER switch electrical connections.**
   - *Bad electrical connections or damaged wires. Clean or replace.*

Symptom: HEADLAMP DIMMING

1. **Check voltage at headlamp at different speeds. Refer to *LIGHTS, INSTRUMENTS AND ACCESSORIES*.**
   - *Insufficient voltage in lighting circuit. Replace voltage regulator and retest.*
2. **Visually inspect wiring harness for damaged and/or melted wires and/or bad wire terminal crimping and/or connections.**
   - *Heating, rotating or sharp part in contact with harness. Improper harness routing. Repair/replace damaged wires and/or terminals. Reroute harness where necessary.*
3. **Verify regulator ground.**
   - *Rusted or loose retaining screws. Clean, apply lithium grease (LMZ1) and firmly tighten screws.*
4. **Check if optional electric accessories are overloading the magneto/generator.**
   - *Excessive electrical load to magneto/generator. Reduce the electrical load by removing excess accessories. Reconnect as recommended by manufacturer.*
5. **Hot grips brand: Verify if they were connected in parallel by mistake.**
   - *Excessive electrical load to magneto/generator. Reconnect as recommended by manufacturer.*
6. **BRP heating grips: Verify if the return wires of the elements were grounded to the chassis by mistake.**
   - *Faulty installation of optional equipment. Reconnect as recommended by manufacturer.*
7. **Check if heating grips installation overloads the magneto capacity.**
   - *Excessive electrical load to magneto/generator. Reduce the electrical load by removing accessories.*

Symptom: HEAT GRIPS DO NOT WORK WHEN ENGINE IS ON IDLE

1. **Normal**
   - *To reduce load on the electrical system, heat grips will start working when engine reach around 2000 RPM.*

Symptom: BRAKE LIGHT REMAINS ON

1. **Check if bulb is properly installed.**
   - *Bulb is not installed correctly (contact elements are reversed). Install bulb correctly.*
2. **Check brake switch.**
   - *Switch contact remains closed. Replace brake switch.*
3. **Check wiring harness.**
   - *Shorted wiring harness. Replace or repair wiring harness.*

STEERING SYSTEM

Symptom: WHEN HANDLEBAR IS TURNED, SNOWMOBILE UNDERSTEERS

1. **Check ski runner condition.**
   - *Worn ski runners. Replace.*
2. **Check front suspension spring preload.**
   - *Insufficient ski pressure on the ground. Increase spring preload.*
3. **Check if front arm stopper strap is too long (rear suspension).**
   - *Insufficient ski pressure on the ground. Shorten stopper strap.*
4. **Check front arm spring preload (rear suspension).**
   - *Insufficient ski pressure on the ground. Loosen spring tension.*

Symptom: HANDLEBAR IS DIFFICULT TO TURN

1. **Check if the handlebar turns freely when skis are off the ground.**
   - *Ball joints corrosion restrains movement. Lubricate or replace the ball joint.*
   - *Component need proper lubrication. Lubricate. Refer to STEERING AND HANDLEBAR.*
   - *Bent parts. Replace parts.*
2. **Check front suspension spring preload.**
   - *Too much preload. Reduce ski spring preload.*
3. **Check position of front arm spring adjustment cam.**
   - *When spring tension is weak, more weight is transferred to the skis. Increase spring preload.*
4. **Check position of stopper strap (rear suspension).**
   - *Too much weight when stopper strap is short. Lengthen front arm stopper strap.*

Symptom: THE SNOWMOBILE ZIGZAGS

1. **Check ski runner condition.**
   - *Worn or bent ski runners. Replace ski runners.*
2. **Check ski alignment.**
   - *Improper ski alignment. Align skis in order to obtain proper toe-out (opening), refer to SKIS AND STEERING ALIGNMENT.*
3. **Check if bushings are too loose in steering system.**
   - *Bushings are too loose. Replace.*
4. **Check ski pressure.**
   - *Too much pressure on skis. Increase center spring preload (rear suspension).*
5. **Check ski runners.**
   - *Wrong ski runner type. Replace.*

SUSPENSION

Symptom: SUSPENSION IS TOO LOW

1. **Check springs preload.**
   - Low spring preload. Increase preload to the recommended position.
2. **Check condition of springs.**
   - Springs are weakened or broken. Replace springs.
3. **Wrong springs.**
   - Springs are too soft. Install optional stiffer springs.
4. **Check condition of shock.**
   - Shock frozen. Repair or replace shock.

Symptom: REAR SUSPENSION BOTTOMS OUT

1. **Check springs preload.**
   - Low spring preload. Increase preload to the recommended position.
2. **Check condition of springs.**
   - Springs are weakened or broken. Replace springs.
3. **Wrong springs.**
   - Springs are too soft. Install optional stiffer springs.
4. **Check condition of the rear shock absorber.**
   - Damaged rear shock absorber. Replace rear shock absorber.
5. **Check gas pressure in HPG shock.**
   - Low gas pressure. Add gas and check for leak.

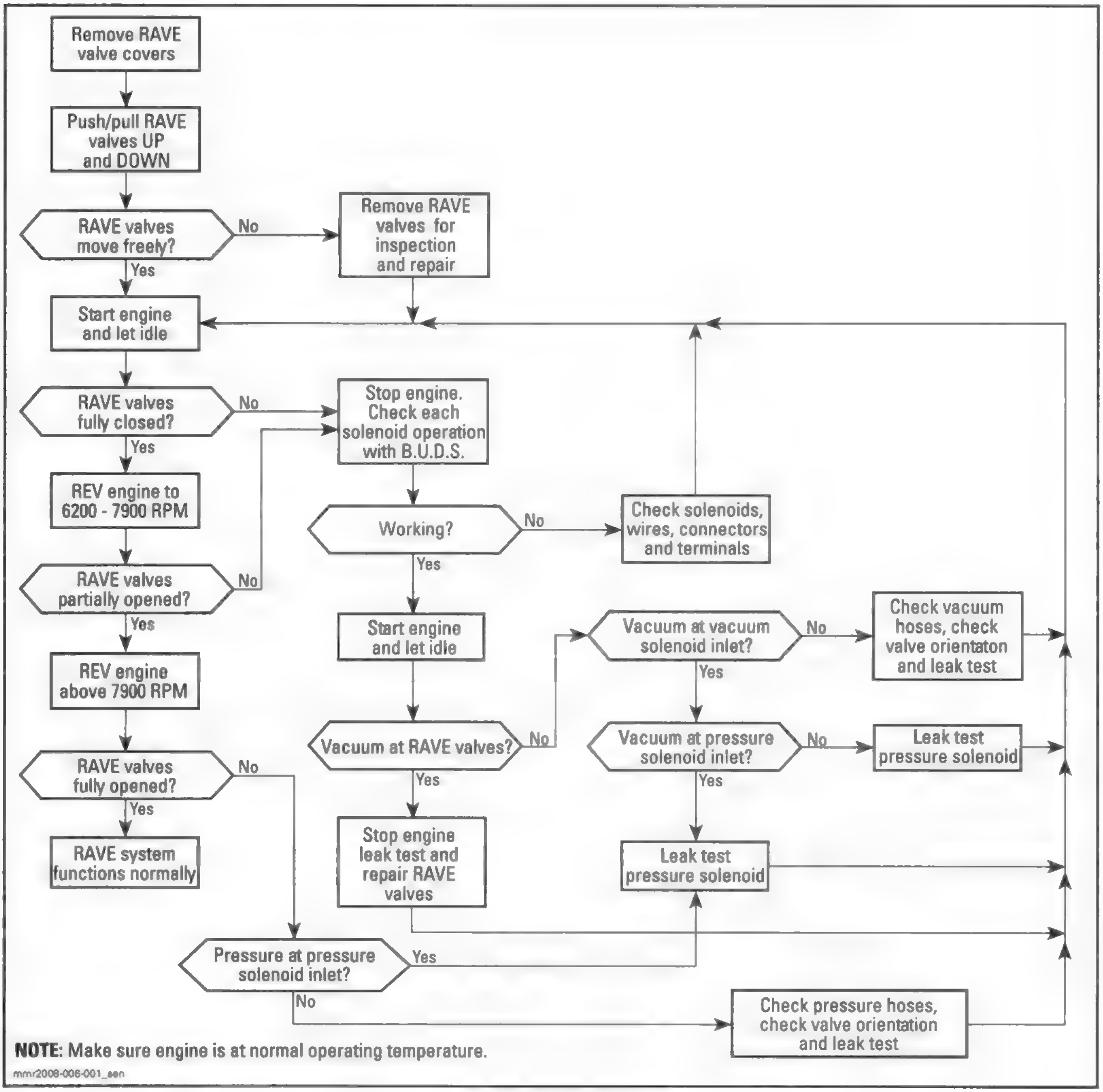
Symptom: REAR SUSPENSION IS TOO STIFF

1. **Check rear spring preload.**
   - Too much preload. Adjust to a softer position.
2. **Wrong springs.**
   - Springs are too stiff. Install optional softer springs.
3. **Check track tension.**
   - Track is too tight. Adjust.
4. **Check condition of the rear shock absorber.**
   - Damaged rear shock absorber. Replace rear shock absorber.

FLOW CHARTS

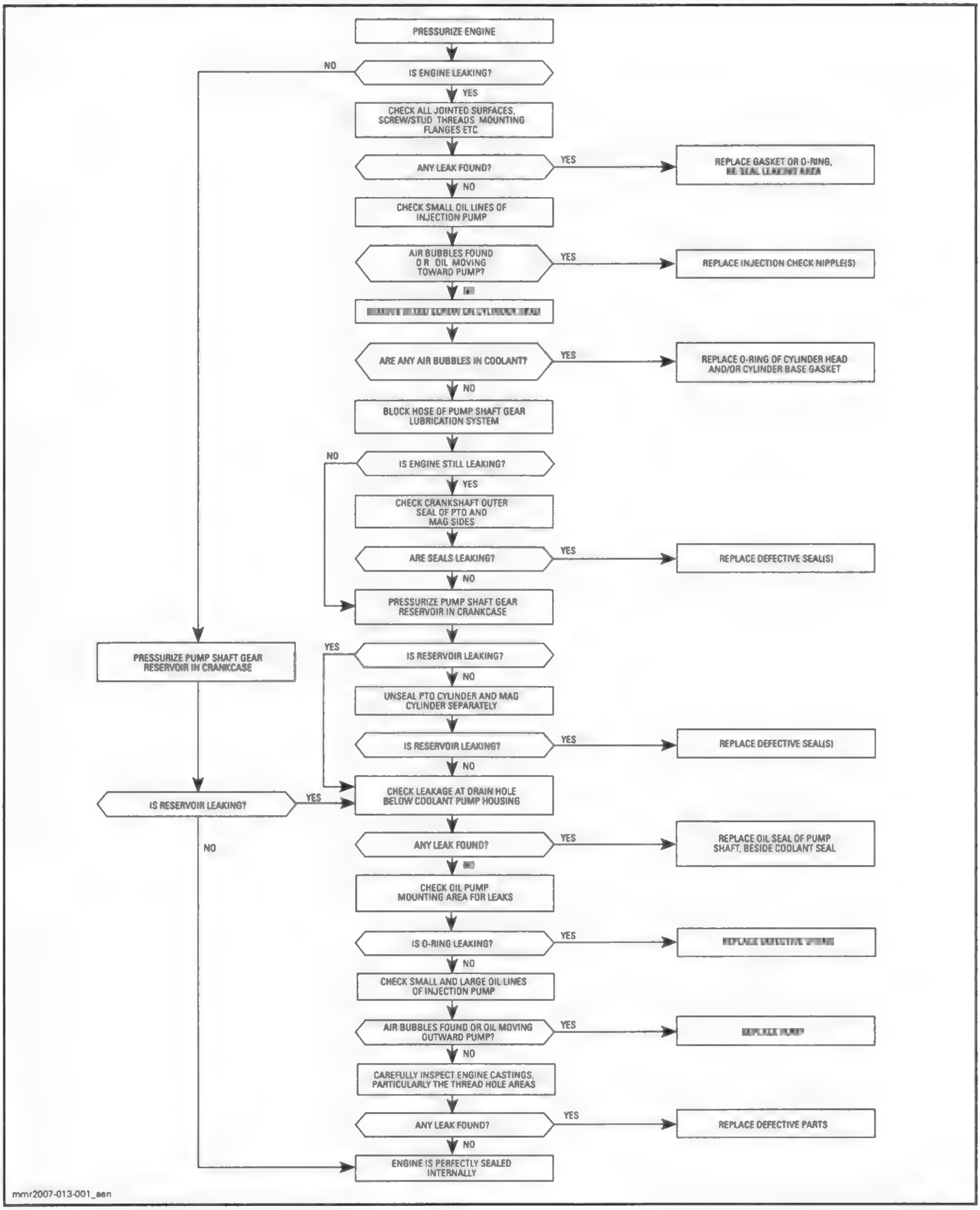
3D RAVE VALVE FLOW CHART

800R


Remove RAVE valve covers
Push/pull RAVE valves UP and DOWN
RAVE valves move freely?
No
Remove RAVE valves for inspection and repair
Yes
Start engine and let idle
RAVE valves fully closed?
No
Stop engine. Check each solenoid operation with B.U.D.S.
Yes
REV engine to 6200 - 7900 RPM
Working?
No
Check solenoids, wires, connectors and terminals
Yes
RAVE valves partially opened?
No
Yes
Start engine and let idle
Vacuum at vacuum solenoid inlet?
No
Check vacuum hoses, check valve orientaton and leak test
Yes
REV engine above 7900 RPM
Vacuum at RAVE valves?
No
Vacuum at pressure solenoid inlet?
No
Leak test pressure solenoid
Yes
Yes
RAVE valves fully opened?
No
Yes
RAVE system functions normally
Stop engine leak test and repair RAVE valves
Leak test pressure solenoid
Pressure at pressure solenoid inlet?
Yes
No
Check pressure hoses, check valve orientation and leak test
mmr2008-006-001_aen

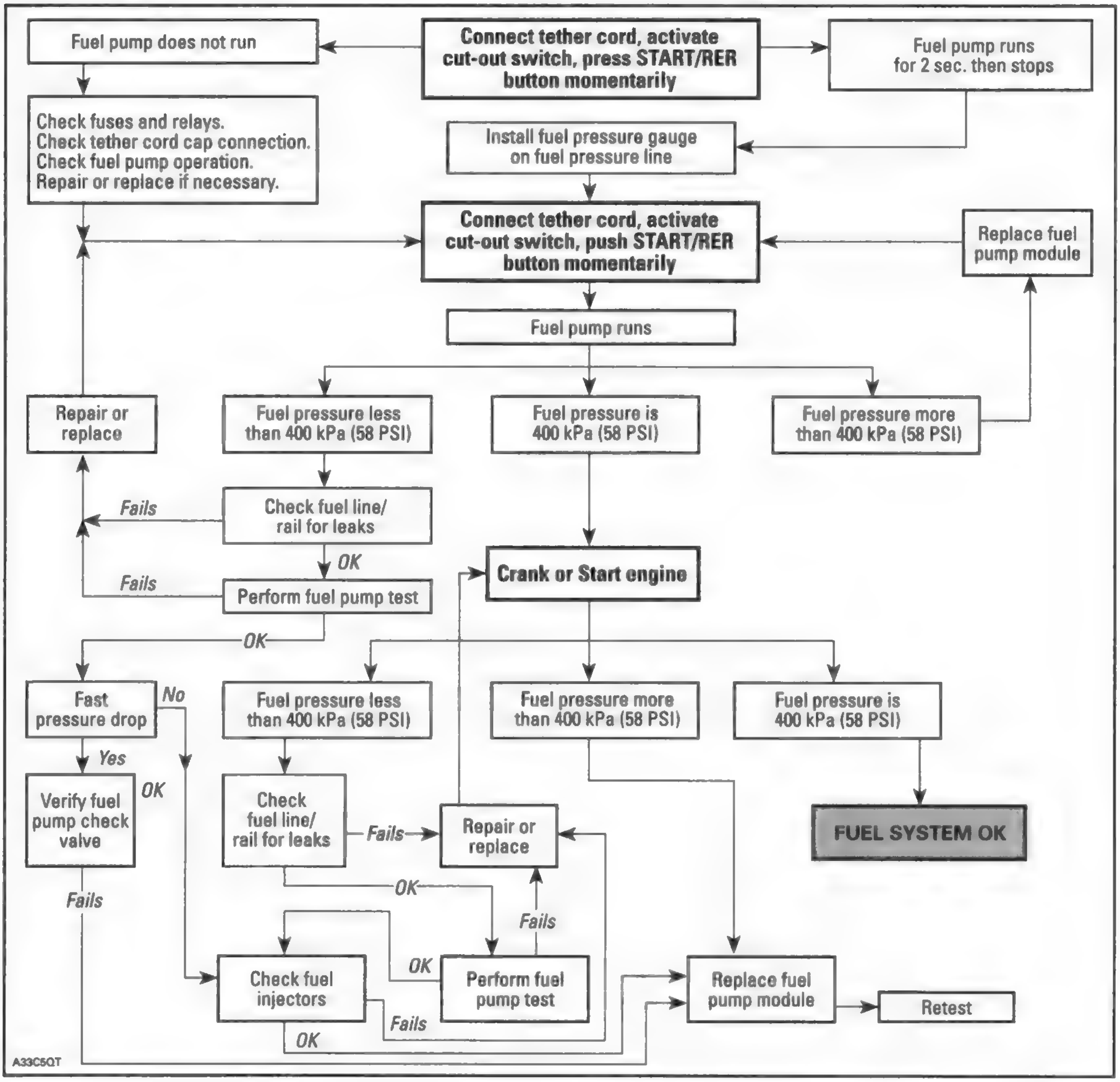
NOTE: Make sure engine is at normal operating temperature.

ENGINE LEAK VERIFICATION FLOW CHART


PRESSURIZE ENGINE
IS ENGINE LEAKING?
NO
YES
CHECK ALL JOINTED SURFACES, SCREW/STUD THREADS MOUNTING FLANGES ETC
ANY LEAK FOUND?
YES
REPLACE GASKET OR O-RING, RE-SEAL LEAKING AREA
NO
CHECK SMALL OIL LINES OF INJECTION PUMP
AIR BUBBLES FOUND O R OIL MOVING TOWARD PUMP?
YES
REPLACE INJECTION CHECK NIPPLE(S)
NO
REMOVE BLEED SCREW ON CYLINDER HEAD
ARE ANY AIR BUBBLES IN COOLANT?
YES
REPLACE O-RING OF CYLINDER HEAD AND/OR CYLINDER BASE GASKET
NO
BLOCK HOSE OF PUMP SHAFT GEAR LUBRICATION SYSTEM
IS ENGINE STILL LEAKING?
NO
YES
CHECK CRANKSHAFT OUTER SEAL OF PTO AND MAG SIDES
ARE SEALS LEAKING?
YES
REPLACE DEFECTIVE SEAL(S)
NO
PRESSURIZE PUMP SHAFT GEAR RESERVOIR IN CRANKCASE
PRESSURIZE PUMP SHAFT GEAR RESERVOIR IN CRANKCASE
IS RESERVOIR LEAKING?
YES
NO
UNSEAL PTO CYLINDER AND MAG CYLINDER SEPARATELY
IS RESERVOIR LEAKING?
YES
REPLACE DEFECTIVE SEAL(S)
NO
IS RESERVOIR LEAKING?
YES
NO
CHECK LEAKAGE AT DRAIN HOLE BELOW COOLANT PUMP HOUSING
ANY LEAK FOUND?
YES
REPLACE OIL SEAL OF PUMP SHAFT, BESIDE COOLANT SEAL
NO
CHECK OIL PUMP MOUNTING AREA FOR LEAKS
IS O-RING LEAKING?
YES
REPLACE DEFECTIVE O-RING
NO
CHECK SMALL AND LARGE OIL LINES OF INJECTION PUMP
AIR BUBBLES FOUND OR OIL MOVING OUTWARD PUMP?
YES
REPLACE PUMP
NO
CAREFULLY INSPECT ENGINE CASTINGS, PARTICULARLY THE THREAD HOLE AREAS
ANY LEAK FOUND?
YES
REPLACE DEFECTIVE PARTS
NO
ENGINE IS PERFECTLY SEALED INTERNALLY
mmr2007-013-001_aen

FUEL DELIVERY DIAGNOSTIC FLOW CHART

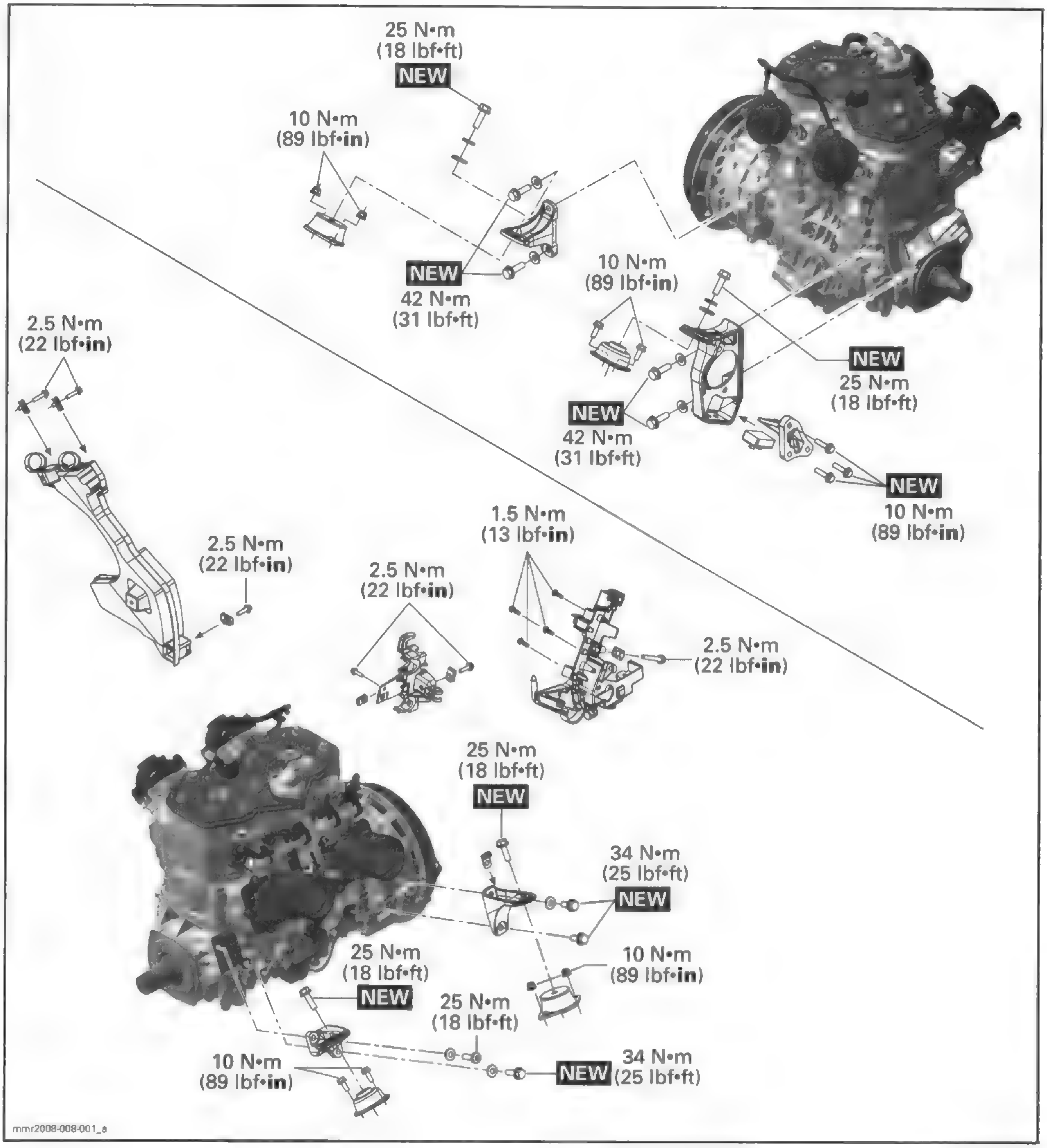
600 HO SDI


Fuel pump does not run
Connect tether cord, activate cut-out switch, press START/RER button momentarily
Fuel pump runs for 2 sec. then stops
Check fuses and relays.
Check tether cord cap connection.
Check fuel pump operation.
Repair or replace if necessary.
Install fuel pressure gauge on fuel pressure line
Connect tether cord, activate cut-out switch, push START/RER button momentarily
Replace fuel pump module
Fuel pump runs
Repair or replace
Fuel pressure less than 400 kPa (58 PSI)
Fuel pressure is 400 kPa (58 PSI)
Fuel pressure more than 400 kPa (58 PSI)
Fails
Check fuel line/ rail for leaks
OK
Crank or Start engine
Fails
Perform fuel pump test
OK
Fast pressure drop
No
Fuel pressure less than 400 kPa (58 PSI)
Fuel pressure more than 400 kPa (58 PSI)
Fuel pressure is 400 kPa (58 PSI)
Yes
Verify fuel pump check valve
OK
Check fuel line/ rail for leaks
Fails
Repair or replace
FUEL SYSTEM OK
OK
Fails
Fails
OK
Check fuel injectors
Perform fuel pump test
Replace fuel pump module
Retest
Fails
OK
A33C5QT

ENGINE REMOVAL/INSTALLATION

SERVICE TOOLS

Description	Part Number	Page
small hose pincher	295 000 076	31, 34
engine removal hook	529 035 829	33, 36–37
spark plug lift ring	529 035 830	33, 36–37


25 N•m
(18 lbf•ft)
NEW
10 N•m
(89 lbf•in)
NEW
42 N•m
(31 lbf•ft)
10 N•m
(89 lbf•in)
NEW
25 N•m
(18 lbf•ft)
NEW
42 N•m
(31 lbf•ft)
NEW
10 N•m
(89 lbf•in)
2.5 N•m
(22 lbf•in)
2.5 N•m
(22 lbf•in)
1.5 N•m
(13 lbf•in)
2.5 N•m
(22 lbf•in)
2.5 N•m
(22 lbf•in)
25 N•m
(18 lbf•ft)
NEW
34 N•m
(25 lbf•ft)
NEW
25 N•m
(18 lbf•ft)
NEW
10 N•m
(89 lbf•in)
25 N•m
(18 lbf•ft)
10 N•m
(89 lbf•in)
34 N•m
NEW
(25 lbf•ft)
mmr2008-008-001_a

GENERAL

During assembly/installation, use the torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pin, etc.) must be replaced with new ones.

PROCEDURES

ENGINE

Engine Removal

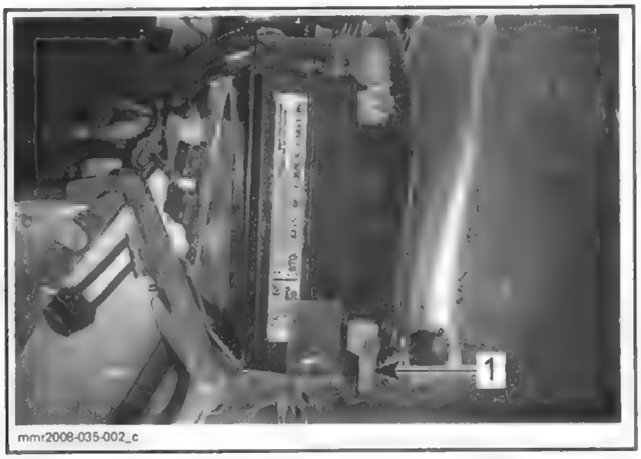
Place vehicle at workstation that will have access to an engine-lifting hoist.

Refer to *BODY* section and remove the following:

- LH and RH side panels
- Hood
- Front bottom pan cover.

On **600 HO SDI**, remove fuel pressure using B.U.D.S. software. Refer to *SEMI-DIRECT INJECTION (SDI)* section.

On **vehicle with electric starter** and on **all 600 HO SDI**, remove the negative cable (–) from battery.

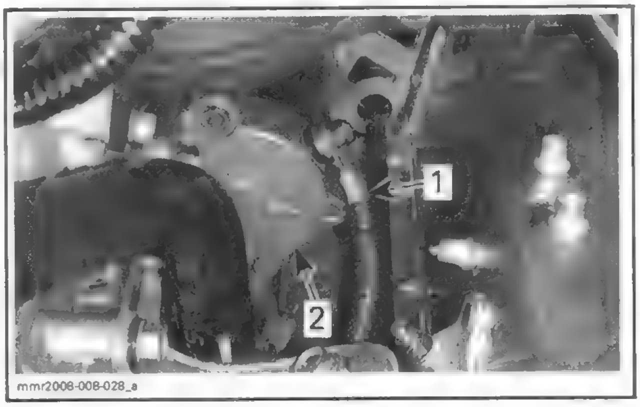


1. Negative cable

Remove muffler and tuned pipe. Refer to *EXHAUST SYSTEM* section.

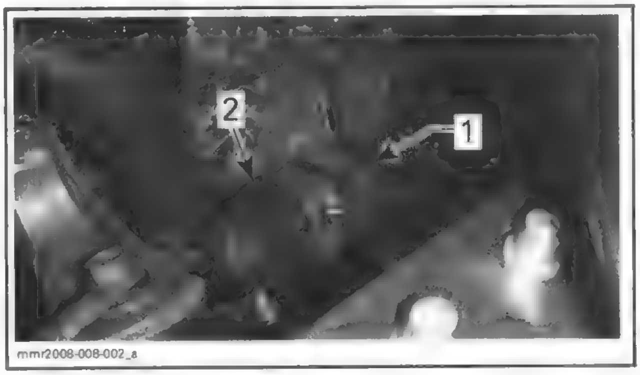
Remove the driven pulley. Refer to *DRIVEN PULLEY AND COUNTERSHAFT* section.

On **vehicle with electric starter**, remove starter cable from starter.



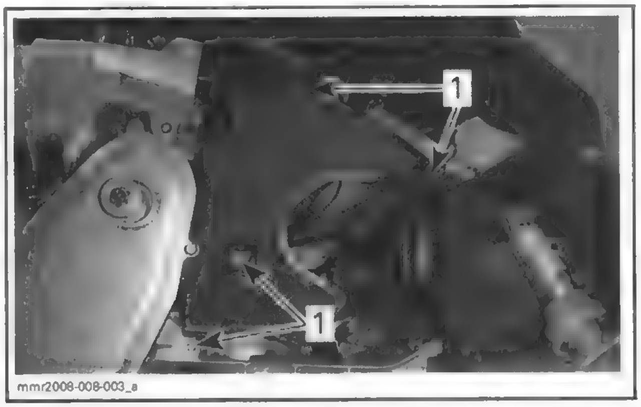
1. Starter cable
2. Starter

Disconnect water pump hose to drain engine.



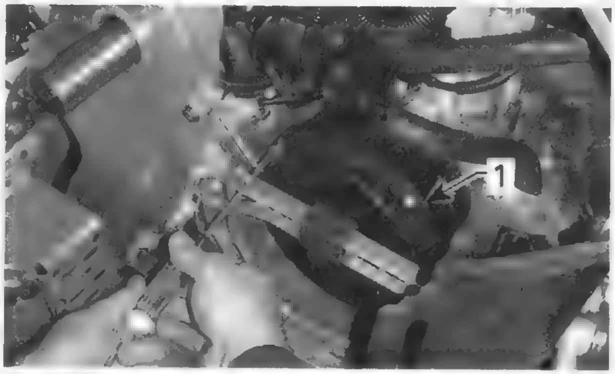
1. Water pump cover
2. Remove this hose

Remove the acoustic panel on the RH side of vehicle.



1. Acoustic panel screws

Remove rewind starter cover screws and place rewind starter housing aside.


1
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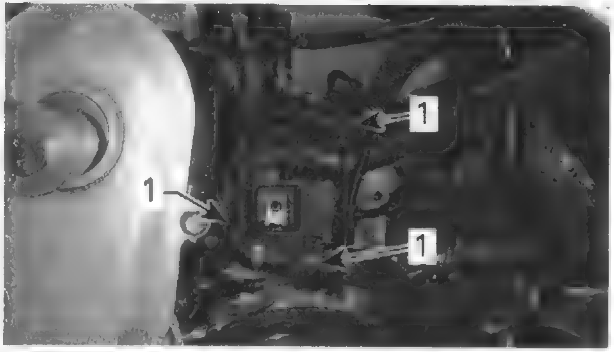
1. *Rewind starter cover*

Cut locking ties securing coolant hose and wiring harness to RAVE solenoid support.


1
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1. *Locking ties to remove*

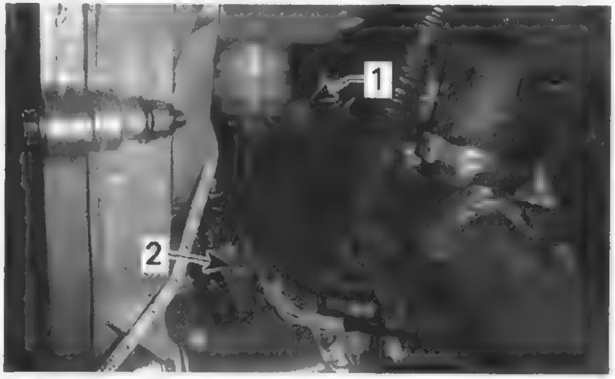
Detach hoses from support.

800R

Unplug RAVE solenoid connector.

500SS and 800R

Unplug trigger coil and magneto connectors.

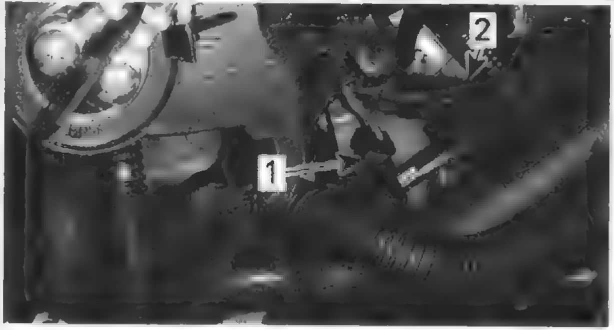

1
2
mmr2008-008-006_a

CONNECTORS LOCATED BEHIND CHAINCASE
1. *Trigger coil connector*
2. *Magneto connector*

Remove YELLOW wires from the magneto connector.

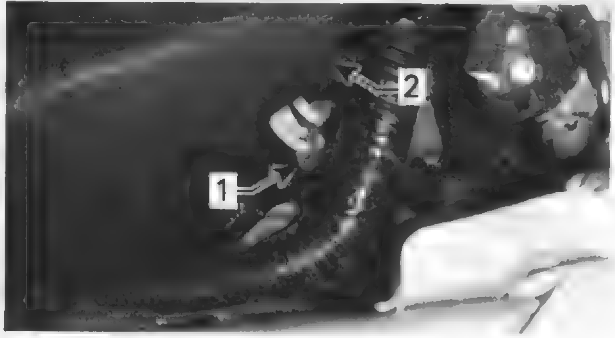
600 HO SDI

Unplug RAVE solenoid connector and RAVE solenoid heater connector.


2
1
mmr2008-008-029_a

1. *RAVE solenoid connector*
2. *Solenoid heater connector*

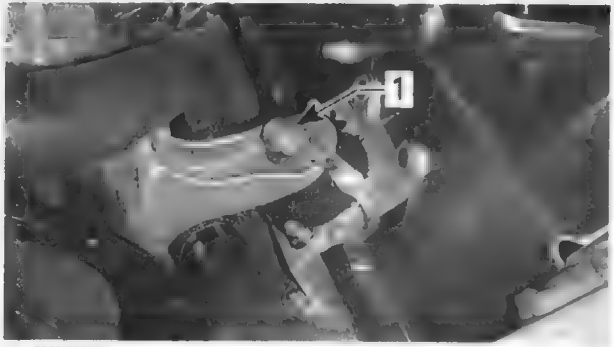
Unplug magneto connector. The connector is located between fuel tank and engine.


2
1
mmr2008-008-030_a

1. *Magneto connector*
2. *front of fuel tank*

All Models

Remove and discard screws securing MAG engine supports to front and rear rubber mounts.


1
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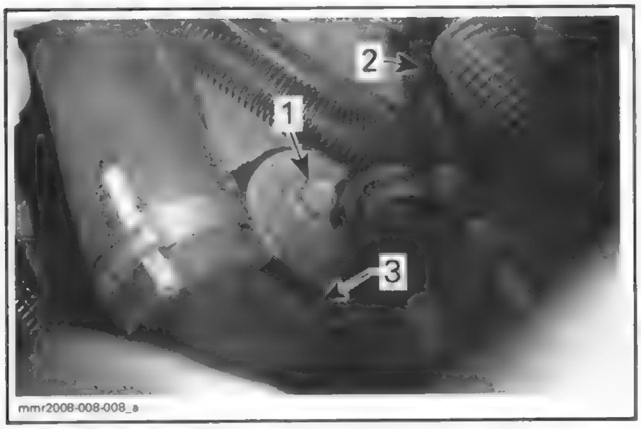
FRONT MAG SUPPORT
1. *Front engine support screw*



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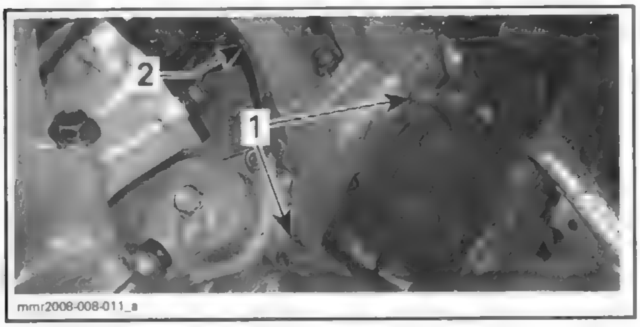
REAR MAG SUPPORT
1. *Rear engine support screw*
2. *Intake adapter*
3. *Thermostat housing*

Remove nuts securing the bottom of countershaft bearing support.



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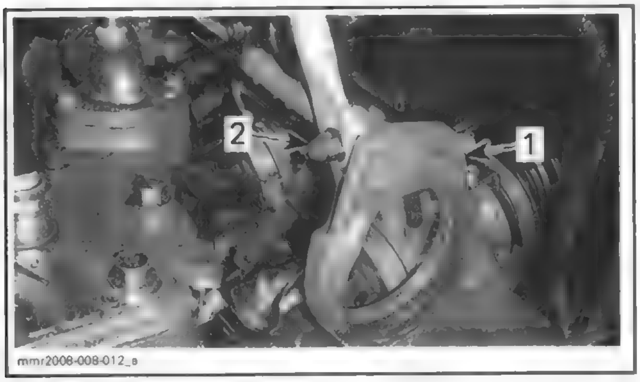
1. *Nuts to remove*
2. *Countershaft bearing support*

Remove bolt retaining the top of countershaft bearing support.



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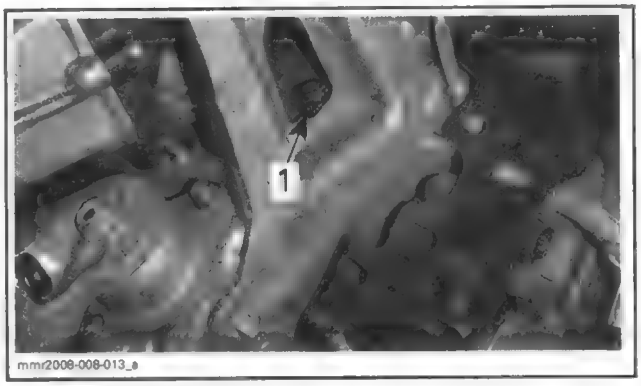
1. *Countershaft bearing support*
2. *Upper bolt*

Loosen lower nut located behind support.



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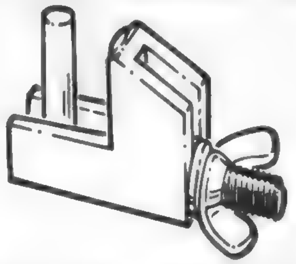
1. *Loosen this nut*

Remove the countershaft bearing support.

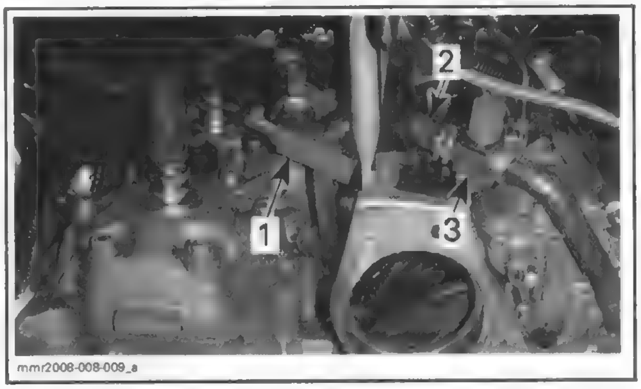
Remove the primary air intake silencer. Refer to *AIR INTAKE SYSTEM* section.

500SS and 800R

Install a small hose pincher (P/N 295 000 076) on heater hose.



295 000 076



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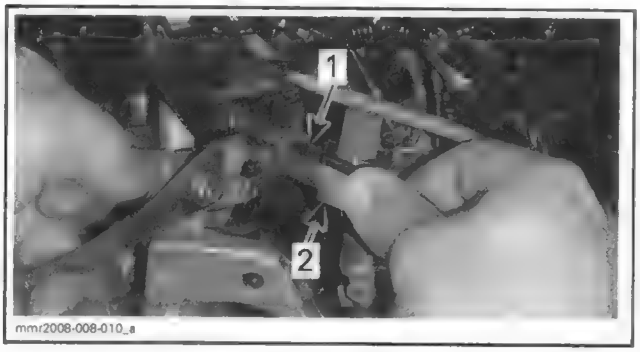
1. *Hose pincher*
2. *Heater hose*
3. *Heater valve*

Disconnect heater hose from heater valve.


1
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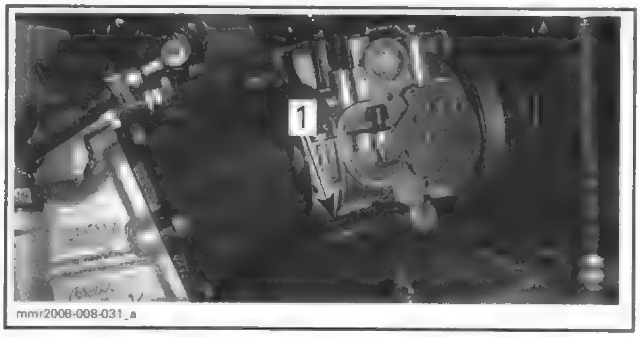
1. Heater hose
2. Heater valve

600 HO SDI

Remove the heater hose from the throttle body.


1
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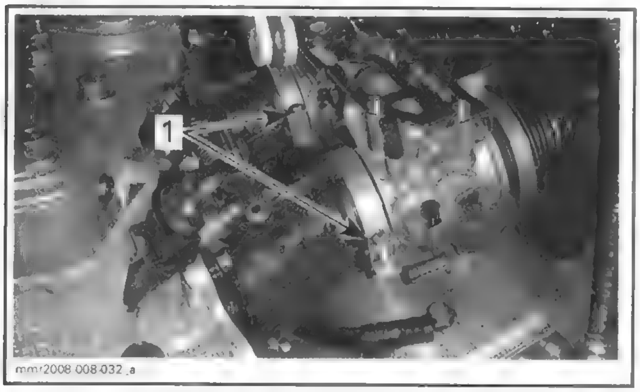
1. Heater hose

All Models

Unscrew clamps securing throttle body or carburetors to intake adapters.


1
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600 HO SDI SHOWN
1. Throttle body clamps

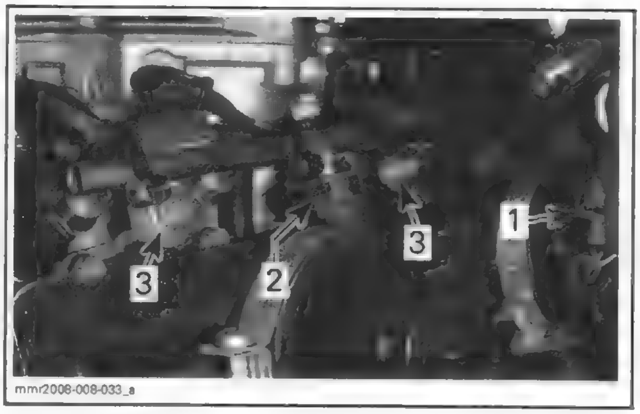
Move and attach throttle body or carburetors aside.

600 HO SDI

Unplug TPS connector from throttle body.

Disconnect fuel line from the fuel rail.

Unscrew fuel rail from cylinder.


3
2
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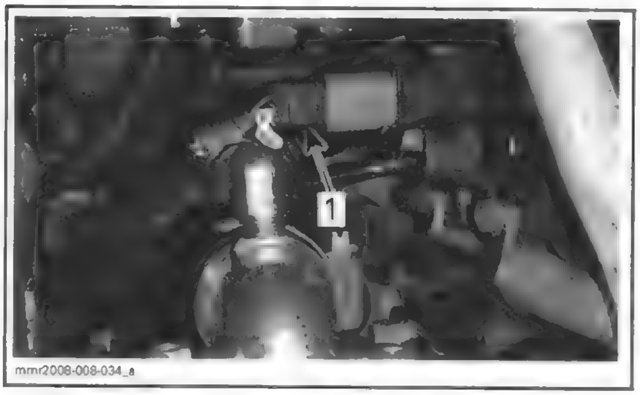
1. TPS connector
2. Fuel line
3. Fuel rail nuts

All Models

Unplug the coolant temperature sensor (CTS) connector.


1
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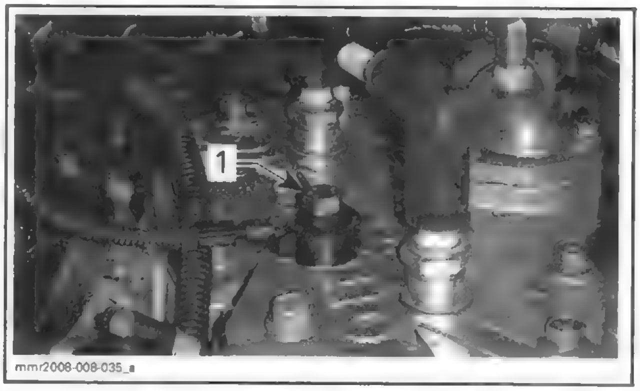
1. CTS connector

600 HO SDI and 800R

Remove the knock sensor.


1
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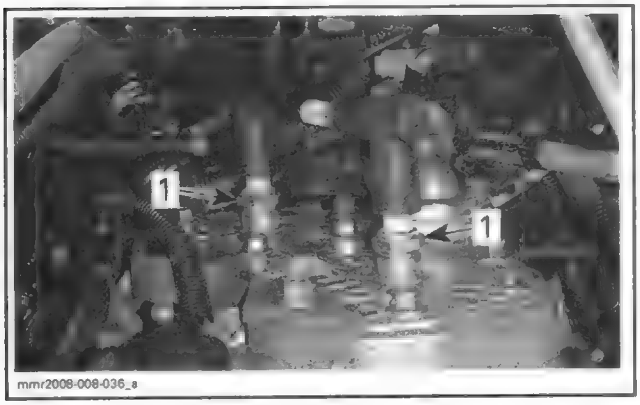
1. Knock sensor screw

All Models

Remove both spark plugs.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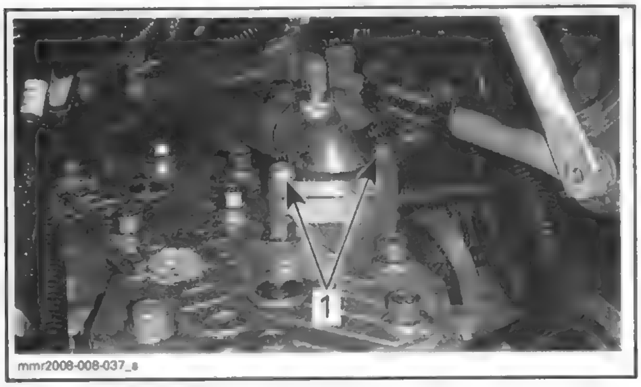
1. Spark plugs

Remove the elbow on cylinder head cover.


1
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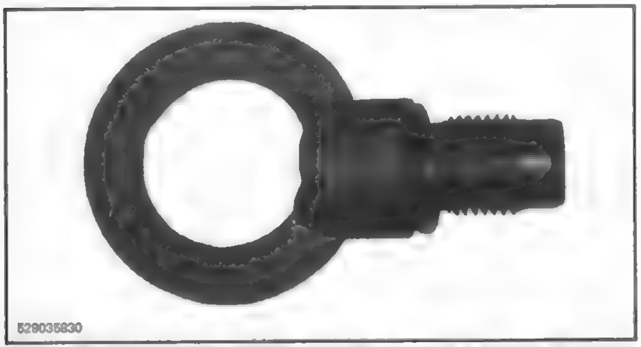
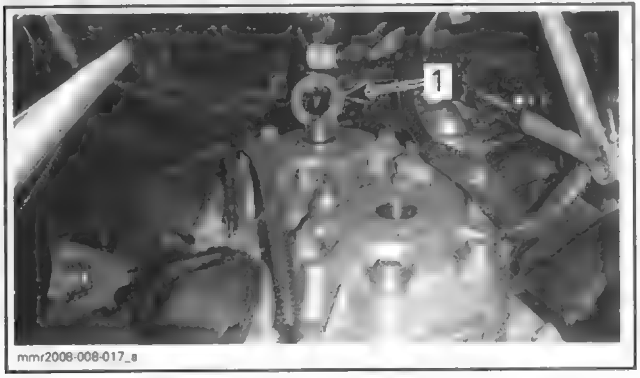
600 HO SDI SHOWN
1. Elbow screws

Install the spark plug lift ring (P/N 529 035 830) in spark plug hole (PTO side).




1
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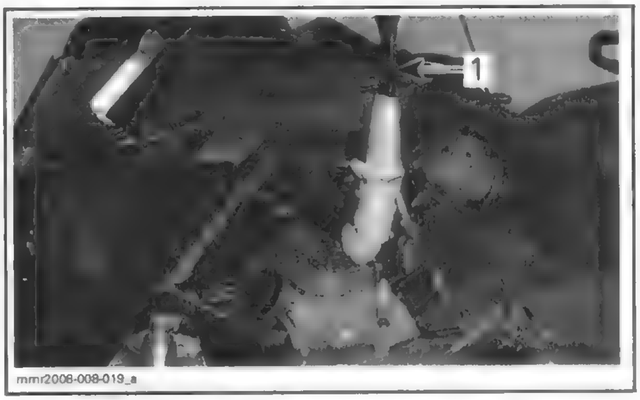
1. Spark plug lift ring

On **models equipped with a high windshield**, remove it to avoid scratches during engine removal.

Install the engine removal hook (P/N 529 035 829).


1
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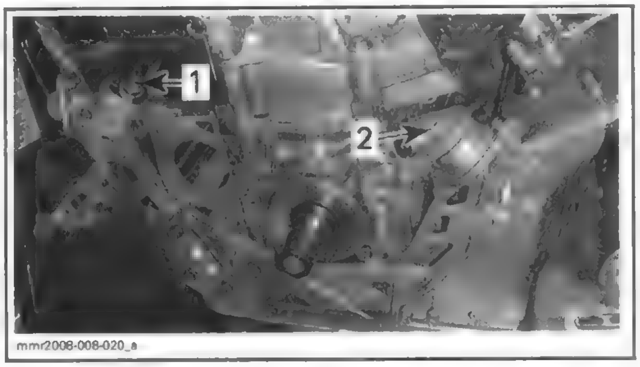
1. Engine removal hook

Remove and discard screws securing PTO engine supports to front and rear rubber mounts.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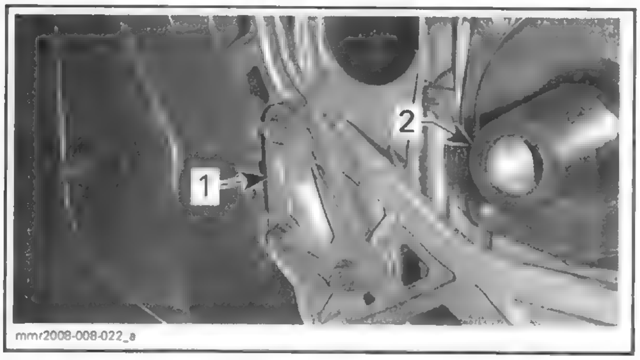
1. Front engine support screw
2. Rear engine support screw

Remove the engine stopper. Discard screws.

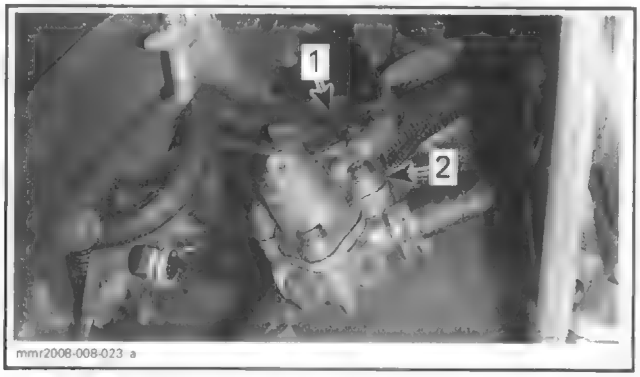

2
1
mmr2008-008-022_a

1. Engine stopper
2. Crankshaft

Lift the engine a little.

500SS and 800R

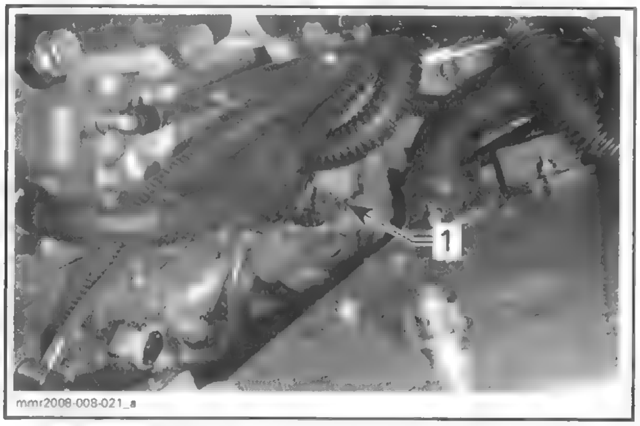
Remove pulse line from fuel pump.


1
2
mmr2008-008-023_a

1. Pulse line
2. Fuel pump

600 HO SDI

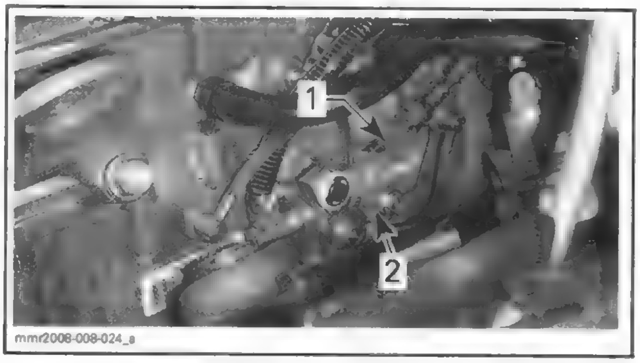
Unplug the crankshaft position sensor connector.


1
mmr2008-008-021_a

1. CPS connector

All Models

Detach oil pump cable from oil pump.


1
2
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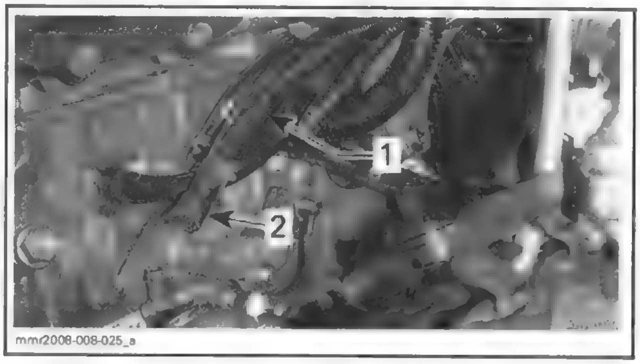
1. Oil pump cable
2. Oil pump

Unplug oil injection inlet hose (hose with a spring) and plug it with an extension (1/4″ drive).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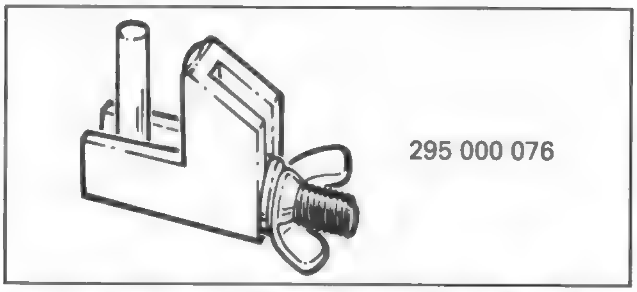
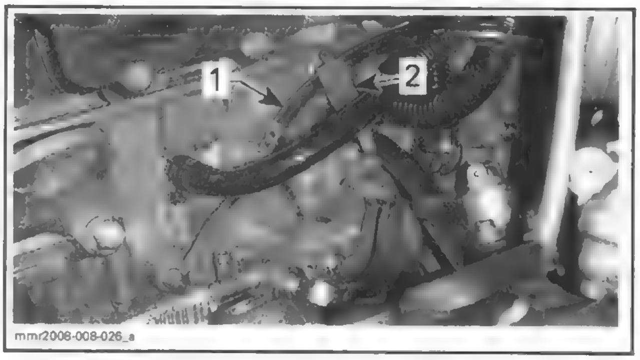
1. Inlet hose
2. Extension

Install a small hose pincher (P/N 295 000 076) on oil injection outlet hose.




1
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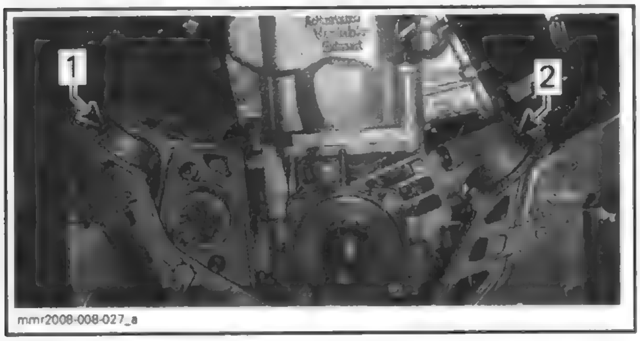
1. Outlet hose
2. Hose pincher

Disconnect the outlet hose.

Remove PTO rubber mounts.


1
2
mmr2008-008-027_a

1. *Front rubber mount*
2. *Rear rubber mount*

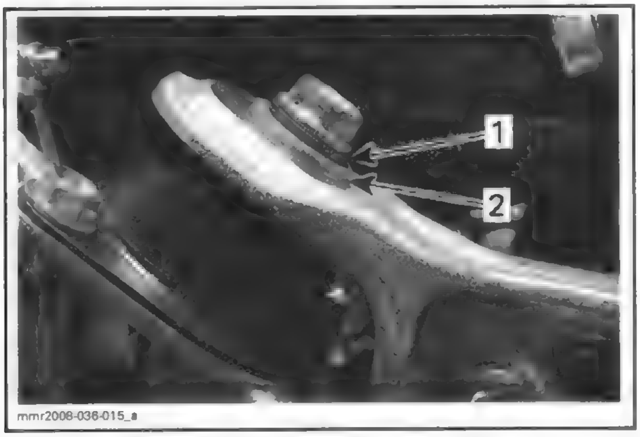
Lift and slide out engine.

Engine Installation

To install the engine, reverse the removal procedure. However, pay attention to the following.

Install **NEW** self-locking screws where required, refer to exploded views at the beginning of this section.

Front engine supports (PTO and MAG sides) are secured using a conical washer and a flat washer.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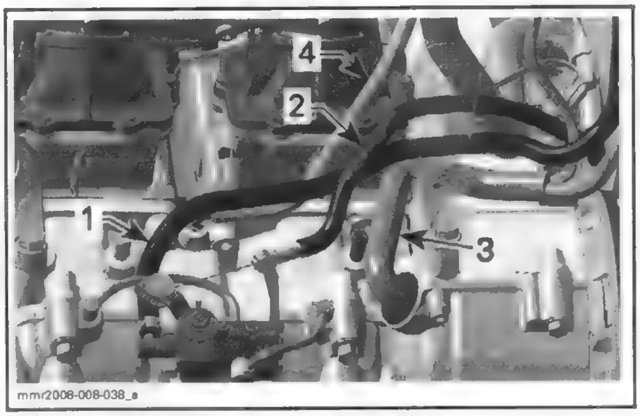
FRONT ENGINE MOUNT (PTO SIDE)
1. *Conical washer*
2. *Flat washer*

Use the following illustration to route hoses, cable and harness correctly.

500SS


4
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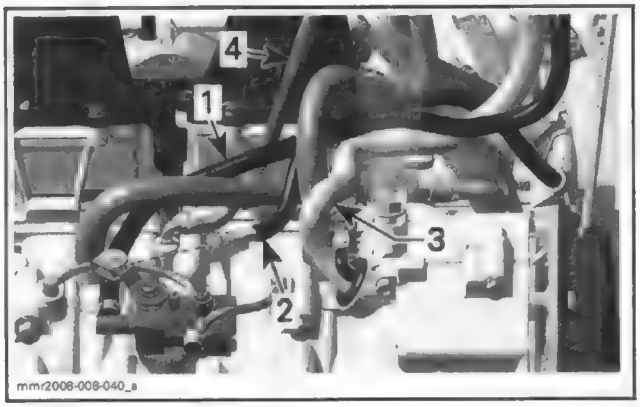
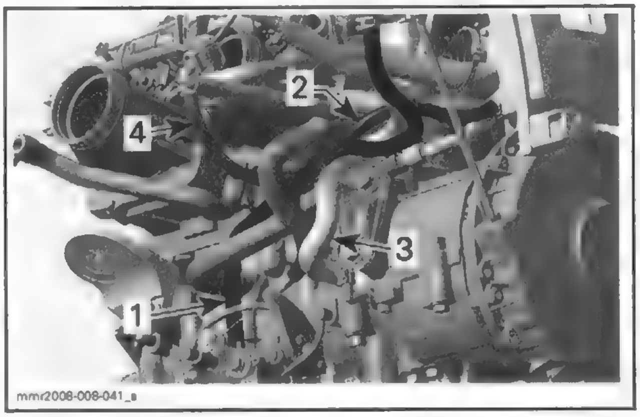
1. *Oil injection inlet hose*
2. *Oil injection pump cable*
3. *Magneto harness*
4. *Crankcase vent hose*

600 HO SDI


4
1
3
2
mmr2008-008-040_a

1. *Oil injection inlet hose*
2. *Oil injection pump cable*
3. *Magneto harness*
4. *Crankcase vent hose*


2
4
3
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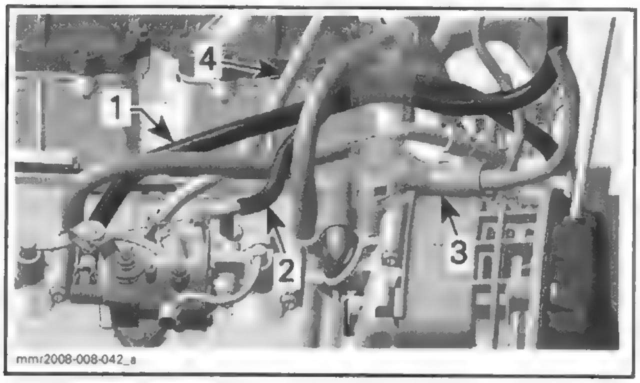
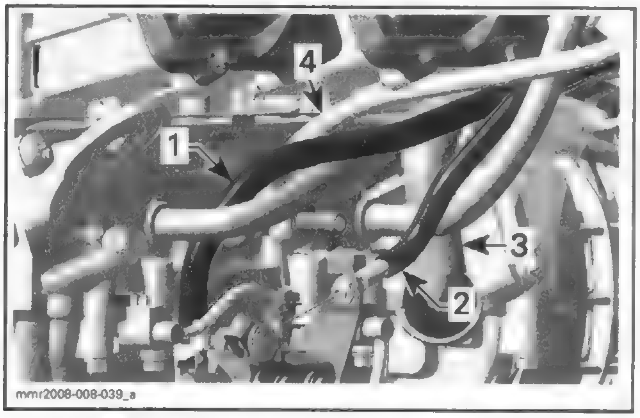
1. *Oil injection inlet hose*
2. *Oil injection pump cable*
3. *Magneto harness*
4. *Crankcase vent hose*

800R



1. *Oil injection inlet hose*
2. *Oil injection pump cable*
3. *Magneto harness*
4. *Crankcase vent hose*



1. *Oil injection inlet hose*
2. *Oil injection pump cable*
3. *Magneto harness*
4. *Crankcase vent hose*

ENGINE SUPPORT

Engine Support Inspection

Check if engine supports are cracked, bent or damaged. Replace if necessary.

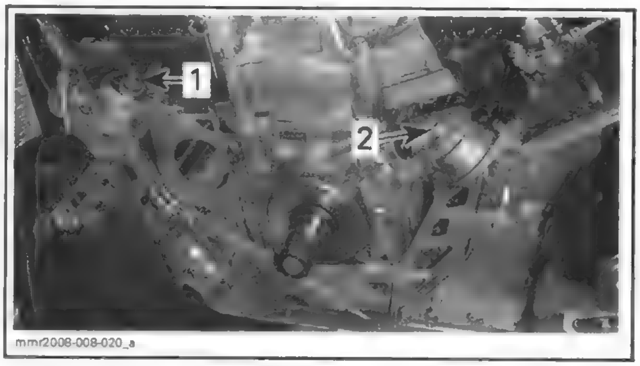
PTO Side Engine Support Removal (Engine not Removed)

NOTE: On **vehicle with electric starter**, remove the electric starter. Refer to *STARTING SYSTEM* section.

Remove drive pulley. Refer to *DRIVE PULLEY* section.

Remove the tuned pipe. Refer to *EXHAUST SYSTEM* section.

Remove and discard screws securing PTO engine supports to front and rear rubber mount adapters.



1. *Front engine support screw*
2. *Rear engine support screw*

Insert a pry bar over the LH frame member and gently raise the engine just enough to remove engine weight from support.

Remove and discard screws retaining engine support to engine.

Remove engine support.

MAG Side Engine Support Removal (Engine not Removed)

Remove muffler and tuned pipe. Refer to *EXHAUST SYSTEM* section.

Remove driven pulley. Refer to *DRIVEN PULLEY* section.

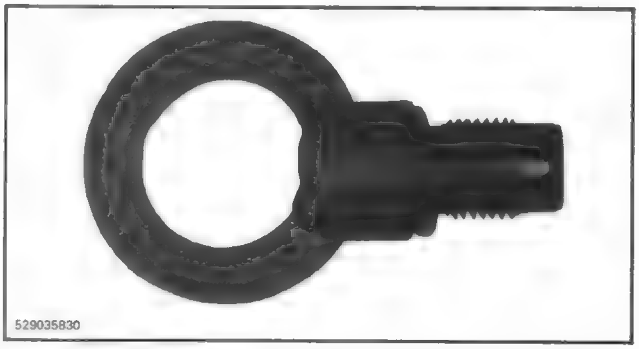
Remove the primary air intake silencer. Refer to *AIR INTAKE SYSTEM* section.

Unscrew clamps retaining throttle body or carburetors to intake adapters.

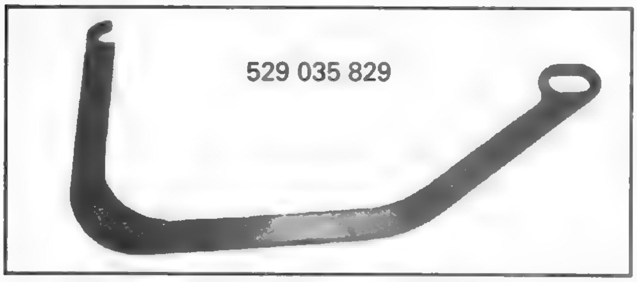
Move and attach throttle body or carburetors aside.

Remove spark plugs.

Install the spark plug lift ring (P/N 529 035 830) in spark plug hole (PTO side).



Install the engine removal hook (P/N 529 035 829).



Remove and discard screws securing engine supports to rubber mount adapters.

Lift engine.

Remove and discard screws retaining engine support to engine.

Remove engine support.

Engine Support Installation

The installation is the reverse of the removal procedure.

ENGINE RUBBER MOUNT

Engine Rubber Mount Inspection

Check rubber mounts. Replace them if brittle, cracked or damaged.

Engine Rubber Mount Removal

Remove muffler and tuned pipe. Refer to *EXHAUST SYSTEM* section.

Remove driven pulley. Refer to *DRIVEN PULLEY* section.

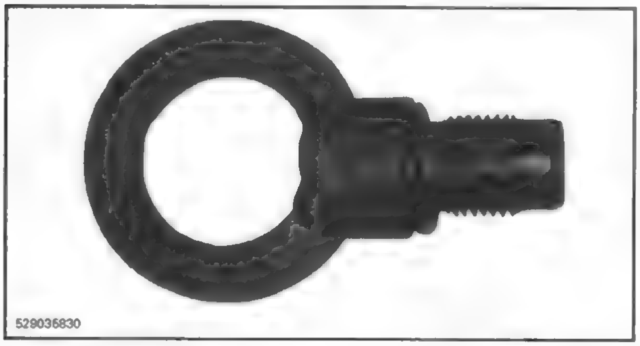
Remove the primary air intake silencer. Refer to *AIR INTAKE SYSTEM* section.

Unscrew clamps retaining throttle body or carburetors to intake adapters.

Move and attach throttle body or carburetors aside.

Remove spark plugs.

Install the spark plug lift ring (P/N 529 035 830) in spark plug hole (PTO side).



Install the engine removal hook (P/N 529 035 829).

Remove and discard screws securing engine supports to rubber mount adapters.

Lift engine.

Unscrew bolts or nuts securing engine rubber mounts to frame.

Engine Rubber Mount Installation

The installation is the reverse of the removal procedure.

ENGINE LEAK TEST

SERVICE TOOLS

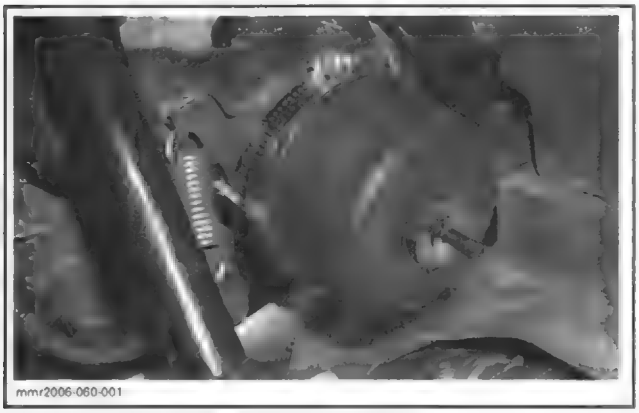
Description	Part Number	Page
small hose pinchers	295 000 076	39
vacuum/pressure pump	529 021 800	39
manifold plug	529 035 961	39
intake plug	529 036 128	39

Prior to take apart an engine, it is important to proceed with a leak test to diagnose engine problems. Whenever the engine is disassembled, a leak test should be performed after reassembly.

PREPARATION

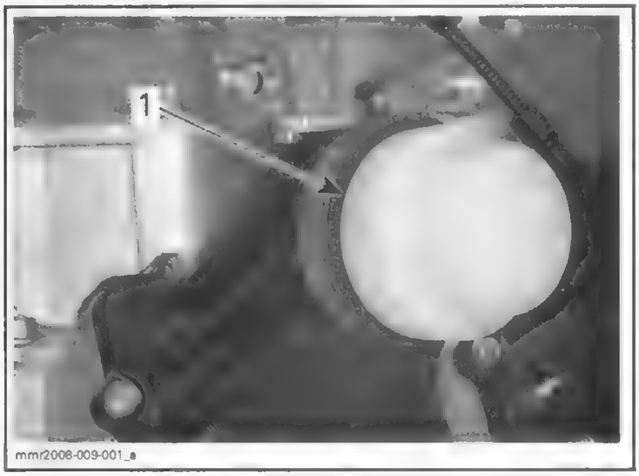
Remove engine. Do not remove the exhaust manifold. Refer to *ENGINE REMOVAL AND INSTALLATION.*

Install manifold plug (P/N 529 035 961) over exhaust manifold and secure with a clamp.



TYPICAL — ENGINE SHOWN IN VEHICLE

Insert an intake plug (P/N 529 036 128) in each intake adaptors. Tighten with existing clamps.



1. *Intake plug*

Using small hose pinchers (P/N 295 000 076), block impulse hose(s) as applicable.

1
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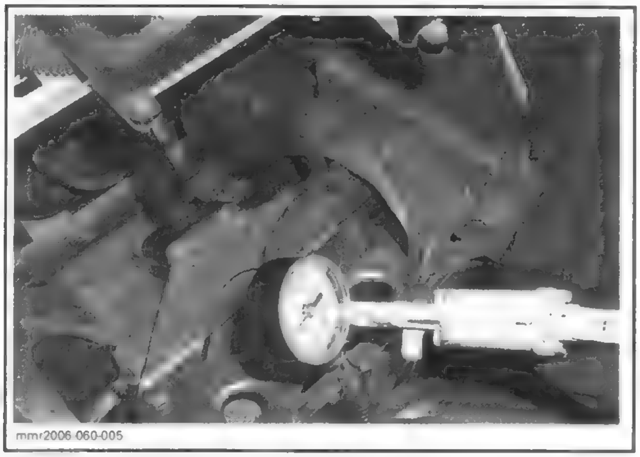
1. *Small hose pincher*

CAUTION: Pay attention not to squeeze hose nipples.

PROCEDURE

NOTE: A flow chart has been prepared as a visual reference. Refer to *FLOW CHARTS* section.

Install vacuum/pressure pump (P/N 529 021 800) on manifold plug.



TYPICAL — ENGINE SHOWN IN VEHICLE

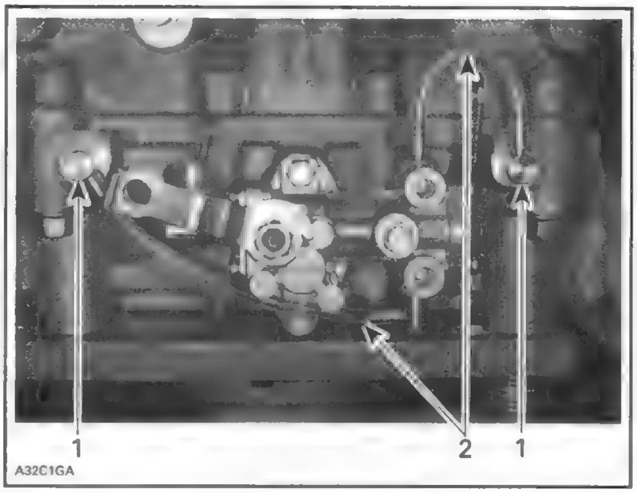
Activate pump and pressurize engine to 34 kPa (5 PSI). Do not exceed this pressure.

Engine must stand this pressure during 3 minutes. If pressure drops before 3 minutes, spray a soapy solution on tester kit (manifold and intake plugs, vacuum/pressure pump and its hose).

- If tester kit (manifold and intake plugs, hoses and pump) is leaking, bubbles will indicate where leak comes from.
- If tester kit is not leaking, check engine, see *ENGINE COMPONENTS TO BE VERIFIED* below.

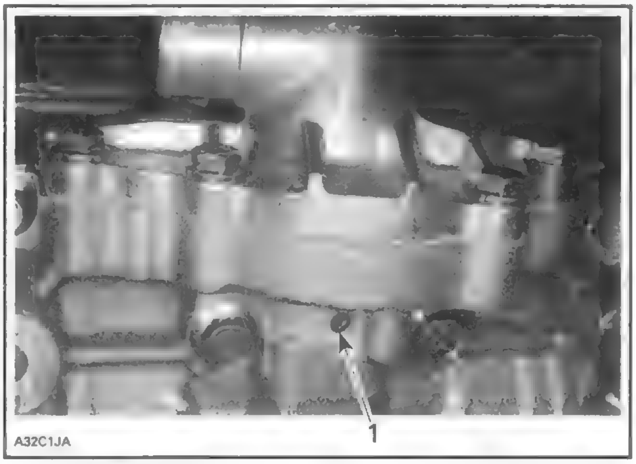
Engine Components to be verified

- All jointed surfaces and screw/stud threads of engine:
  - spark plug base, insulator
  - cylinder head
  - RAVE valve bellows, piston and housing
  - cylinder
  - crankcase halves (joint)
  - oil injection pump mounting flange (O-ring)
  - coolant pump housing
  - bleed screws/plugs
  - Fuel injector O-rings (**600 HO SDI**).
- Small injection oil lines coming from pump. Air bubbles or oil column going toward pump, indicates a defective check valve in injection nipple.



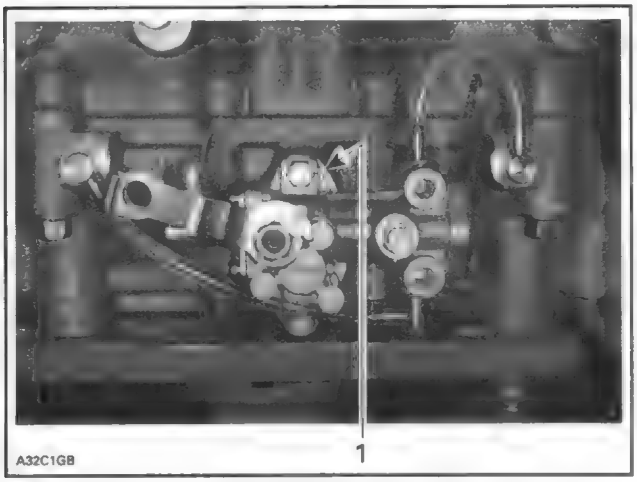
TYPICAL
1. Injection nipples
2. Small injection oil lines

- Air bubbles in antifreeze. It indicates defective cylinder head O-ring or cylinder base gasket.
- Crankshaft outer seals. One behind drive pulley and the other behind magneto.
- Pump shaft gear oil reservoir. See *PUMP SHAFT OIL GEAR RESERVOIR* further in this section.
- Leak indicator hole below coolant pump housing. If there is a leak, it indicates that a pump shaft is defective (oil seal behind coolant ceramic seal).



1. Leak indicator hole

- Leaks can also be on oil pump side. Check mounting area for leaks.



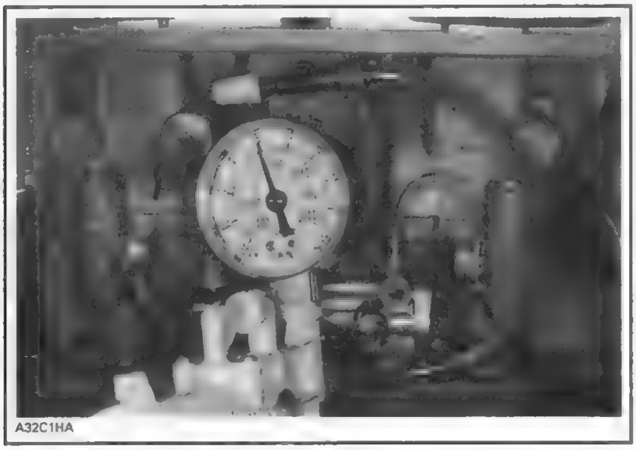
TYPICAL
1. *Check mounting area*

- If there is a leak at the tested location, it is recommended to continue testing next items before overhauling engine. There is a possibility of more than one leak.

If leak still persists, it indicates a defective casting somewhere in engine. Disassemble engine and carefully check for defects in castings. Pay attention to tapped holes which may go through engine sealed area and thus lead to leakage.

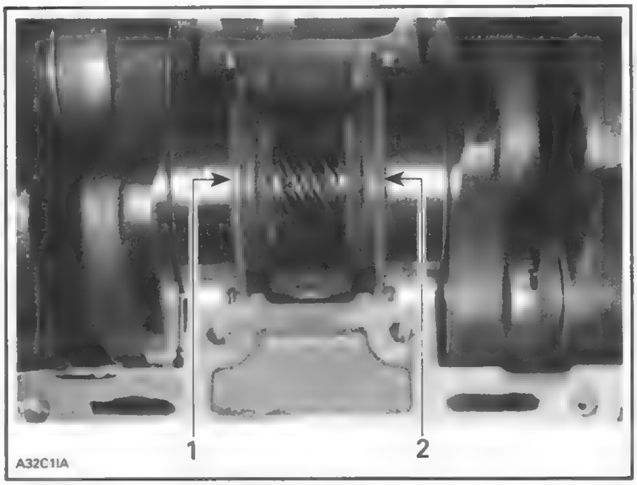
Pump Shaft Oil Gear Reservoir

Install air pump on reservoir fitting and pressurize engine to 34 kPa (5 PSI). Do not exceed this pressure.

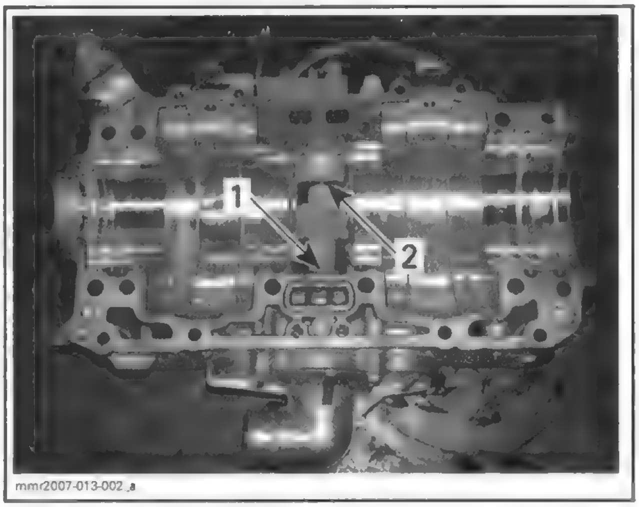


TYPICAL

If pressure drops, it indicates a defective crankshaft inner seal or a defective oil seal either on water pump side or oil pump side.



CRANKCASE INSIDE VIEW
1. *Leakage through inner seal on PTO side*
2. *Leakage through inner seal on MAG side*



CRANKCASE INSIDE VIEW
1. *Leakage through water pump seal (reservoir side)*
2. *Leakage on oil pump side (seal or O-ring)*

ENGINE MEASUREMENT

SERVICE TOOLS

Description	Part Number	Page
dial indicator	414 104 700	47–48
degree wheel	529 035 607	48

NOTE: This subsection explains the procedures to correctly measure engine components. For the engine technical specifications, refer to *INSPECTION* in the appropriate *ENGINE* subsection.

CYLINDER HEAD WARPAGE

Check gasketed surface of the cylinder head with a straight edge and a feeler gauge. Make sure part is within the given specification. If cylinder head is out of specification, replace it. Verify combustion chamber volume to use the correct cylinder base gasket with the new part.

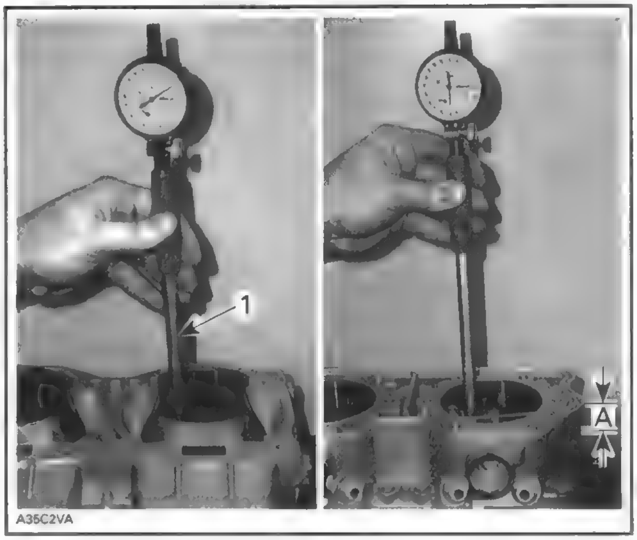
CYLINDER TAPER

Measure cylinder diameter in the following locations:

- Above exhaust port
- Below intake port.

Compare cylinder diameters. If the difference exceeds the specified dimension, the cylinder should be rebored and honed or should be replaced. Nikasil cylinder can be honed using diamond hone but can not be rebored.

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.

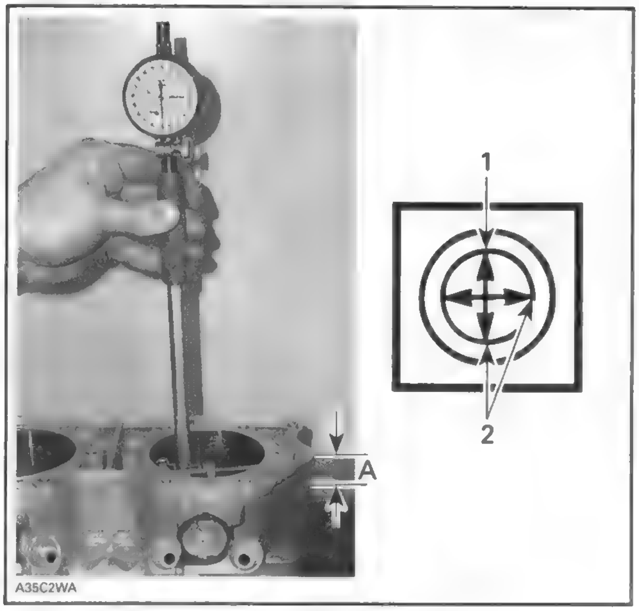


1. Below the intake port
A. Above exhaust port

CYLINDER OUT OF ROUND

Measuring above exhaust port with a cylinder gauge, check if the cylinder out of round is more than the specified dimension. If larger, cylinder should be rebored and honed or should be replaced. Nikasil cylinder can be honed using diamond hone but cannot be rebored.

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.

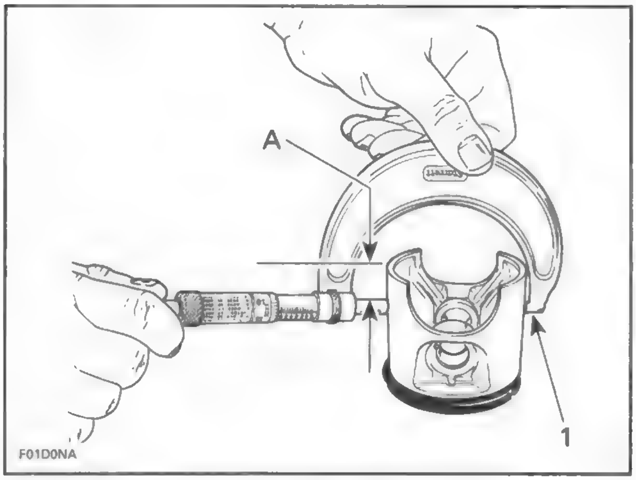


1. Piston pin position
2. Measures to be compared
A. Above exhaust port

CYLINDER/PISTON CLEARANCE

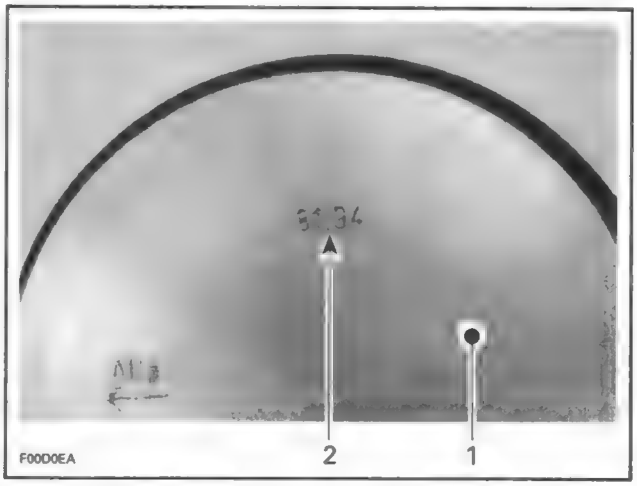
Procedure with a Used Piston

Using a micrometer, measure piston at "A" perpendicularly (90°) to piston pin.



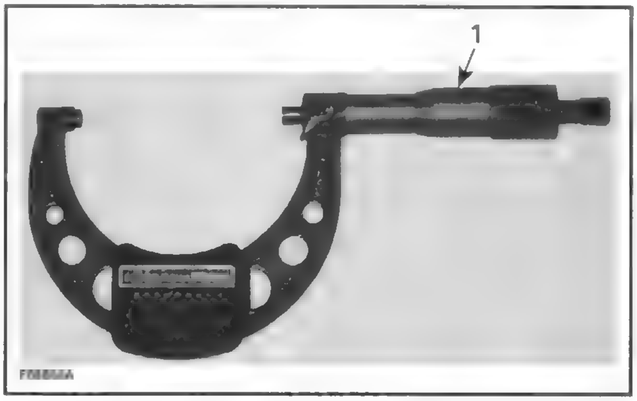
TYPICAL
1. Measuring perpendicularly (90°) to piston pin axis
A. 15 mm (.590 in)

The measured dimension must not be less than 0.15 mm (.006 in) of the one scribed on piston dome. Otherwise, install a new piston.



TYPICAL
1. Piston dome
2. Piston measurement

If piston is within tolerance, adjust and lock a micrometer to the piston dimension.

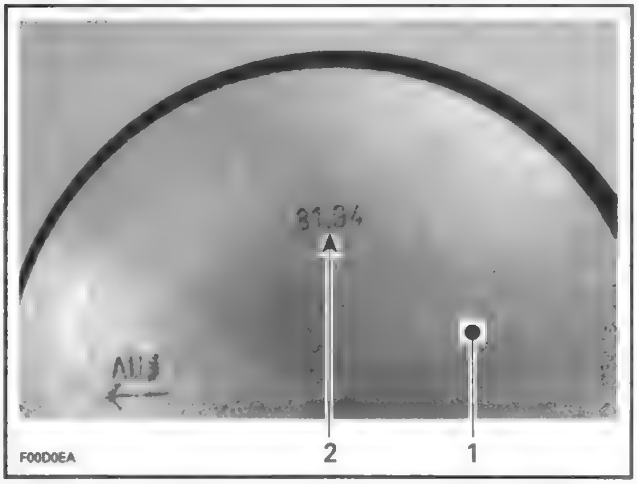


1. Micrometer set to the piston dimension

Refer to *PROCEDURE CONTINUATION WITH A NEW OR USED PISTON* further.

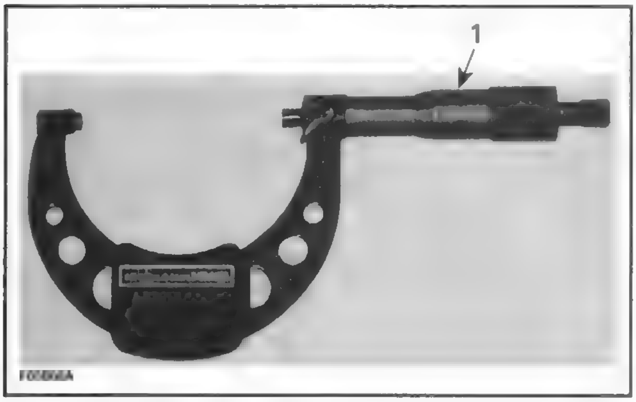
Procedure with a New Piston

Take the measurement on the piston dome.



1. Piston dome
2. Piston measurement

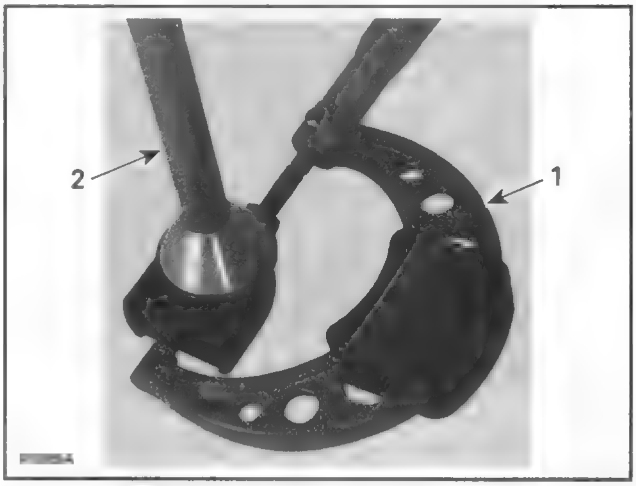
Adjust and lock a micrometer to the specified value on the piston dome.



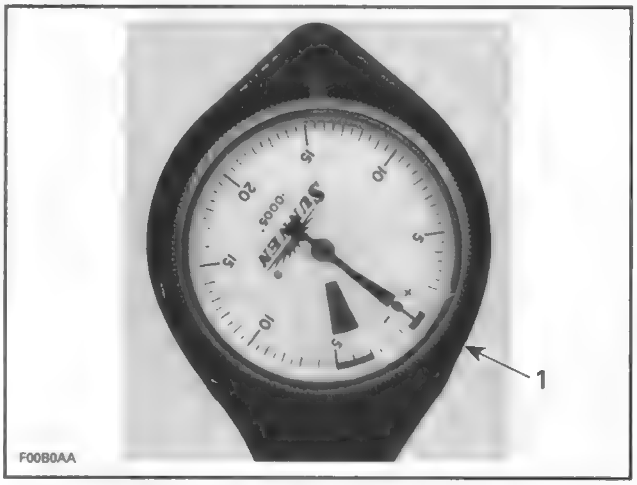
1. Micrometer set to the piston dimension

Procedure Continuation with a New or Used Piston

With the micrometer set to the piston dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0.



1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge

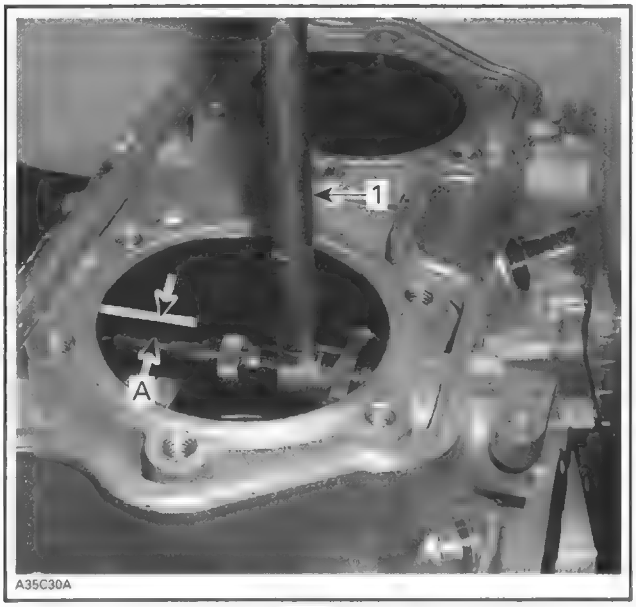


1. Indicator set to 0 (zero)

NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.

Position the dial bore gauge above the exhaust port.

IMPORTANT: Always remove cylinder-block from crankcase before measuring.



1. Measuring perpendicularly (90°) to piston pin axis
A. Above exhaust port

Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance. If clearance exceeds specified tolerance, replace cylinder and piston.

NOTE: Oversize pistons are available for the 593 engine only.

RING/PISTON GROOVE CLEARANCE

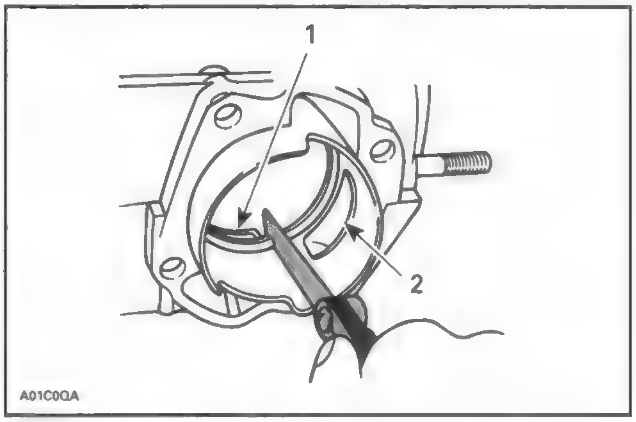
Using a feeler gauge check clearance between rectangular ring and groove. Replace piston if clearance exceeds specified tolerance.

RING END GAP

Position ring halfway between transfer ports and intake port.

NOTE: In order to correctly position the ring in the cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. Replace ring if gap exceeds specified tolerance.

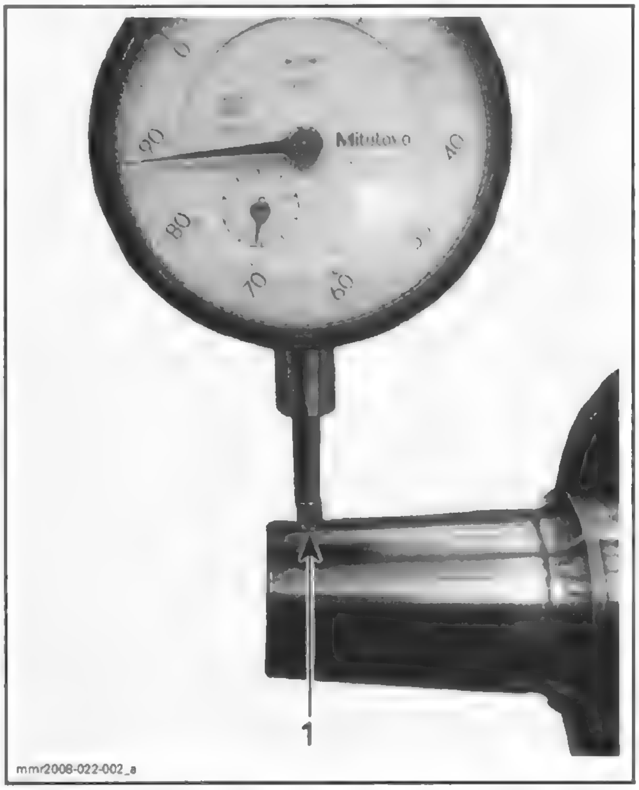


TYPICAL
1. Transfer port
2. Intake port

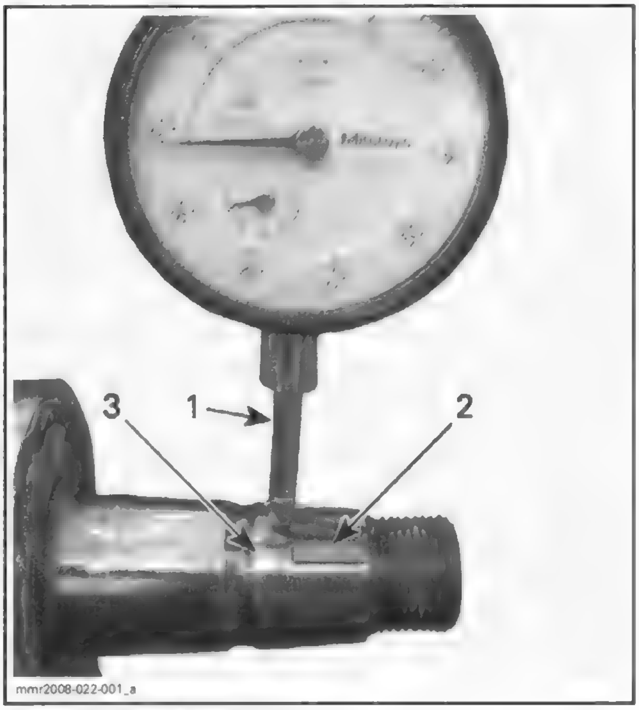
CRANKSHAFT DEFLECTION

Measuring in Crankcase

Using a dial indicator, check deflection with crankshaft in crankcase.



TYPICAL — PTO SIDE
1. Measure deflection 3 mm (1/8 in) from crankshaft end

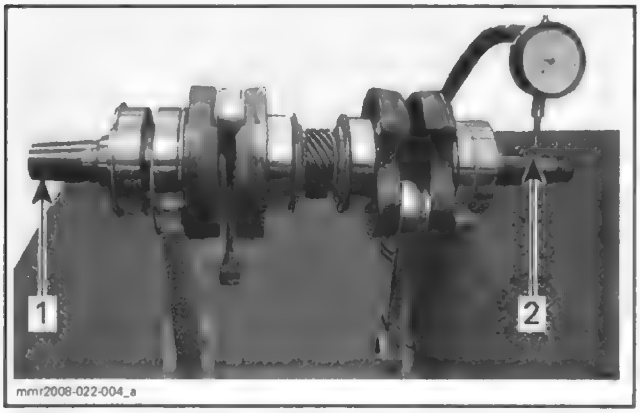


TYPICAL — MAG SIDE
1. *Measure deflection at mid point between key and groove*
2. *Key*
3. *Groove*

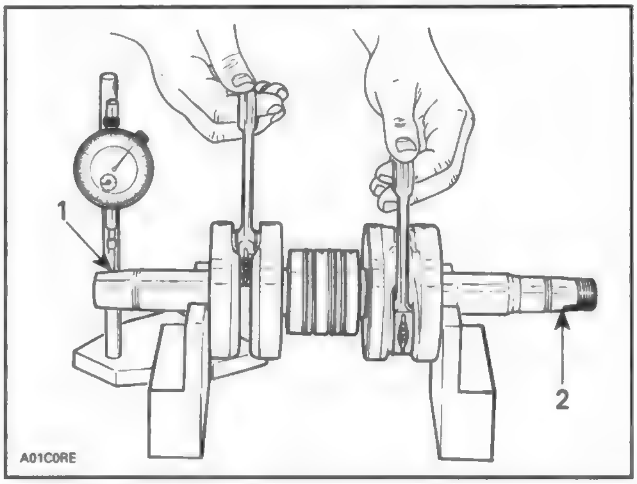
If deflection exceeds the specified tolerance, recheck deflection using V-shaped blocks to determine the defective part(s). See *MEASURING ON BENCH*.

Measuring on Bench

Once engine is disassembled, check crankshaft deflection on V-shaped blocks. If deflection exceeds the specified tolerance, it can be worn bearings or a bent crankshaft. Remove crankshaft bearings and check deflection again on V-shaped blocks to determine the defective part(s).



TYPICAL — V-SHAPED BLOCKS POSITION WITH BEARINGS
1. *Measure deflection 3 mm (1/8 in) from crankshaft end*
2. *Measure deflection at mid point between key and groove*



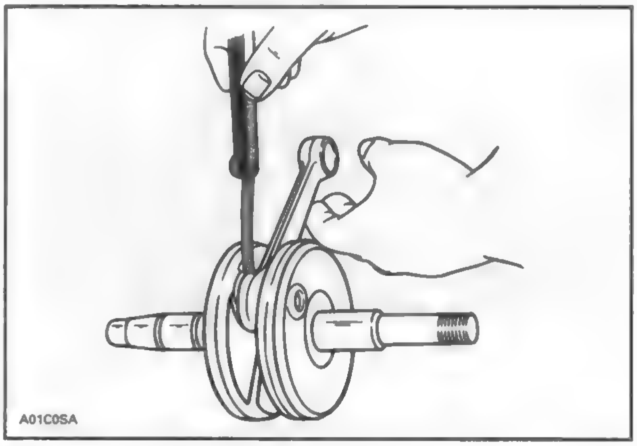
TYPICAL — V-SHAPED BLOCKS POSITION WITHOUT BEARINGS
1. *Measure deflection 3 mm (1/8 in) from crankshaft end*
2. *Measure deflection at mid point between key and groove*

NOTE: Crankshaft deflection cannot be correctly measured between centers of a lathe.

If the deflection exceeds the specified tolerance, crankshaft should be repaired or replaced.

CONNECTING ROD BIG END AXIAL PLAY

Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight. If the distance exceeds specified tolerance, repair or replace the crankshaft.

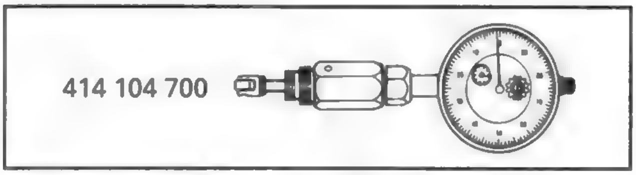


TYPICAL

CRANKSHAFT ALIGNMENT

Remove both spark plugs.

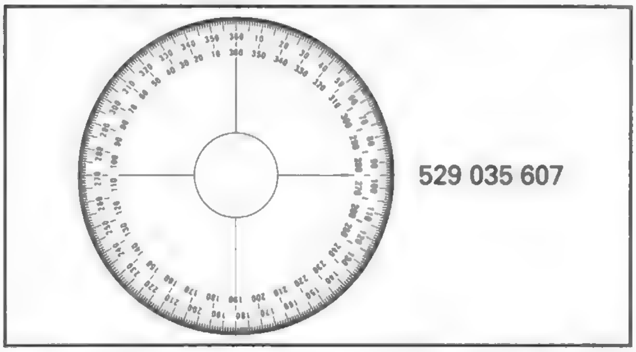
Install the dial indicator (P/N 414 104 700) in spark plug hole on MAG side.

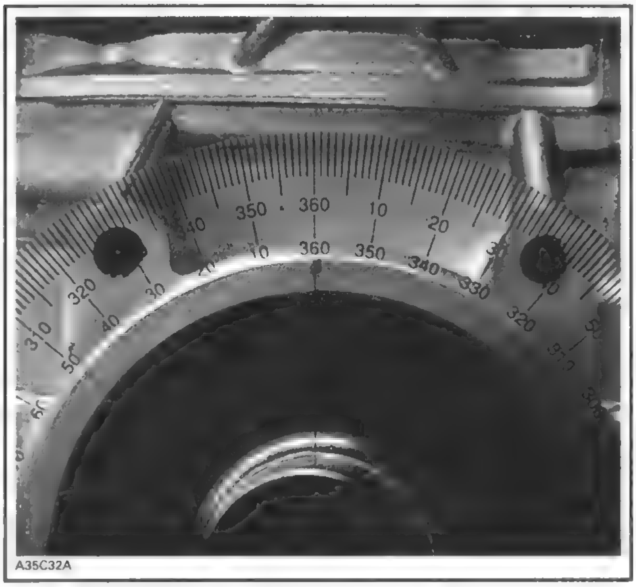


Bring MAG piston at top dead center.

Scribe a mark on crankcase.

Install degree wheel (P/N 529 035 607) on crankshaft end so that 360° mark aligns with the mark on crankcase. Do not rotate crankshaft.





Remove dial indicator and install it in spark plug hole on PTO side.

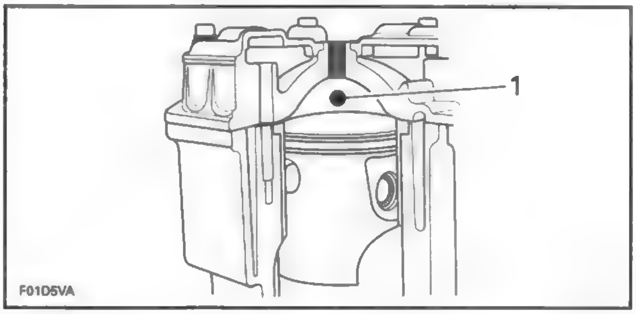
Bring PTO piston to top dead center. Degree wheel must rotate with crankshaft.

Interval between cylinders must be 180° ± 0.5.

Any other reading indicates a misaligned (twisted) crankshaft.

COMBUSTION CHAMBER VOLUME MEASUREMENT

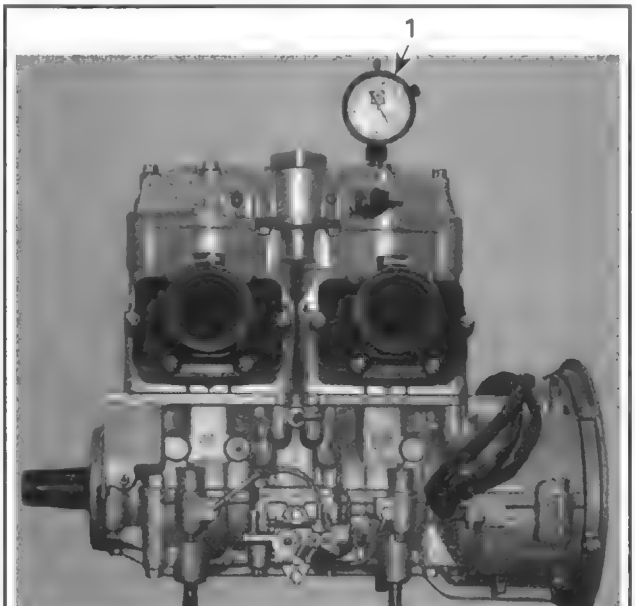
The combustion chamber volume is the region in the cylinder head above the piston at Top Dead Center (TDC). It is measured with the cylinder head installed on the engine.



TYPICAL
1. Combustion chamber

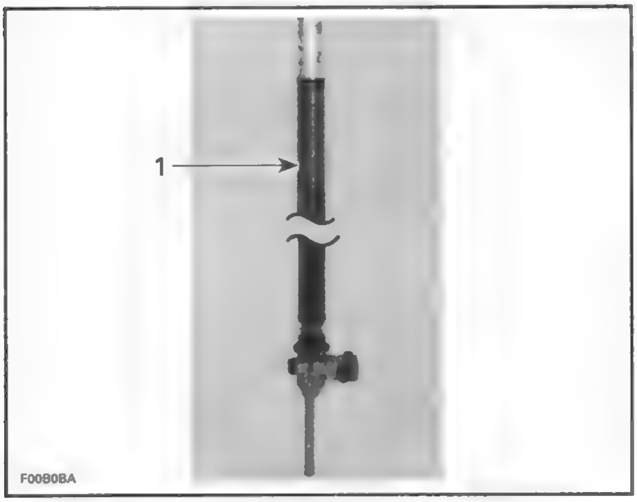
NOTE: When checking the combustion chamber volume, engine must be cold, piston must be free of carbon deposits and cylinder head must be leveled.

- Remove cylinder head cover and apply on each piston ring end gap a dab of grease to seal it.
- Reinstall cylinder head cover, refer to *TOP END* in *ENGINE* section.
- Remove both spark plugs and bring one piston to Top Dead Center using the dial indicator (P/N 414 104 700).



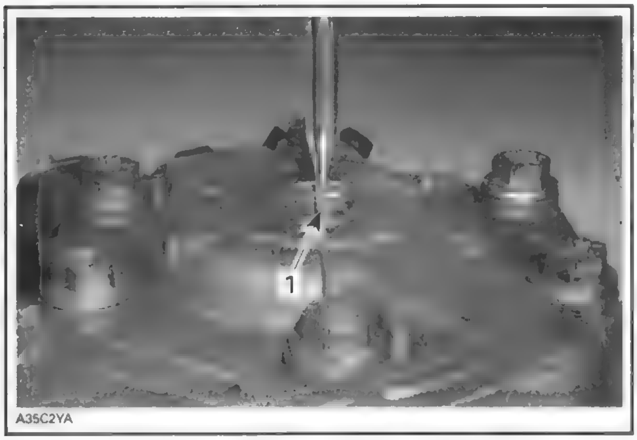
1. Bring piston to TDC

- Obtain a graduated burette (capacity 0 - 50 cc) and fill with mineral injection oil.



1. *Graduated burette (0 - 50 cc)*

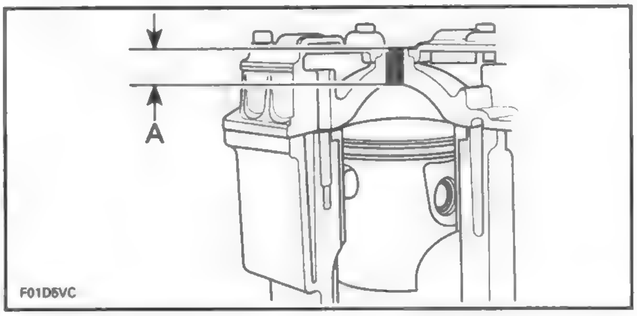
- Open burette valve to fill its tip then close valve.
- Let oil settle in burette then add oil until level reaches 0 cc.
- Inject the burette content through the spark plug hole until oil touches the top spark plug hole then close burette valve.



1. *Top of spark plug hole*

NOTE: The oil level in cylinder must not drop for a few seconds after filling. If so, there is a leak between piston and cylinder. The recorded volume would be false. Repair engine then repeat procedure.

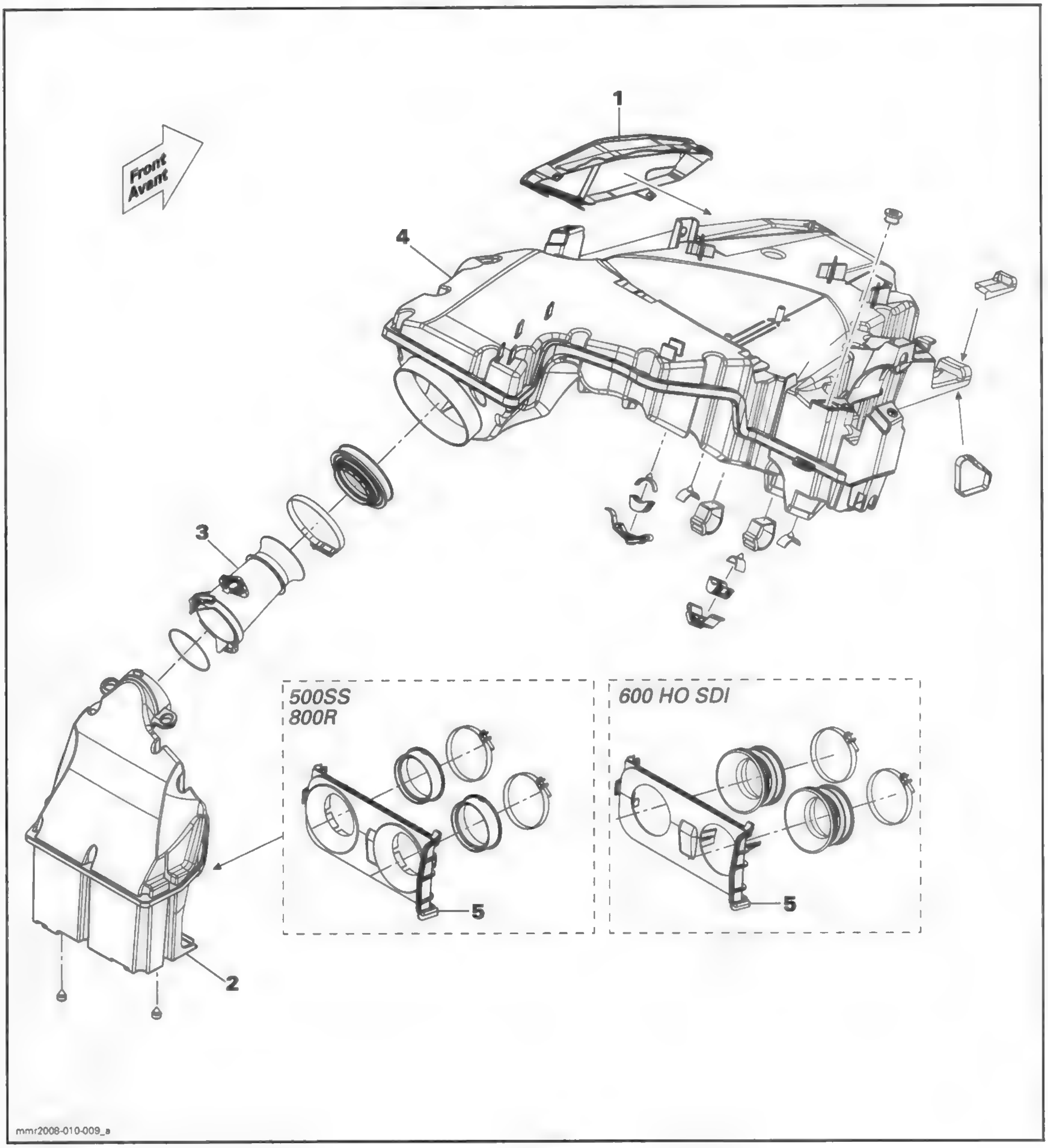
- Let burette stand upward for about 10 minutes, until oil level is stabilized.
- Read the burette scale to obtain the quantity of oil injected in the combustion chamber.
- Deduct 2.25 cc from the value obtained on the burette, this amount corresponds to the cylinder head spark plug well.



TYPICAL
A. Spark plug well

- Repeat procedure for the other cylinder.
- When completed, compare cylinders measurement with specified tolerances.
- If necessary, install a thicker or thinner cylinder/crankcase gasket in order to obtain the specified combustion chamber volume.
- Repeat procedure until specified tolerances are obtained.

AIR INTAKE SYSTEM


1
Front
Avant
4
3
500SS
800R
600 HO SDI
5
5
2
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PROCEDURES

AIR FILTER

Air Filter Removal

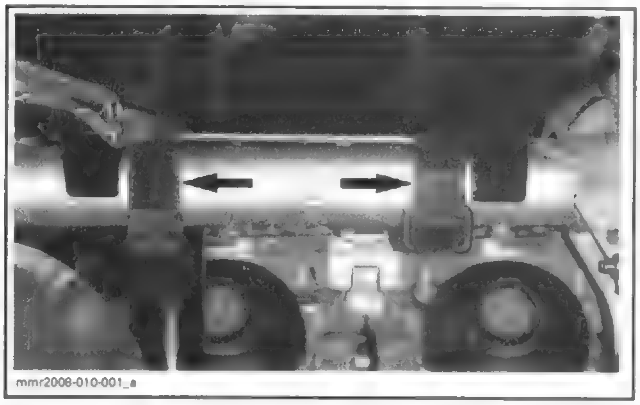
The air filter **no. 1** is located on left hand side of secondary air intake silencer **no. 4**.

Refer to *BODY* and remove:

- Hood
- Bottom pan cover
- LH side panel.

Remove left upper console screw.

Pull off both front secondary air intake silencer Velcro straps.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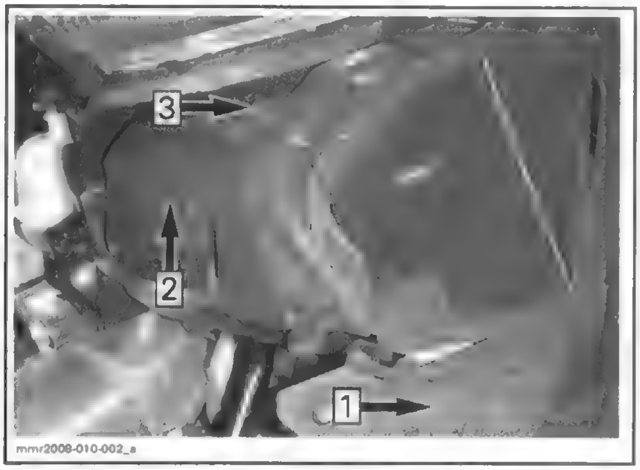
Gently pull upper section of bottom pan and lift front of secondary air intake silencer.

Unlatch all 5 air filter retaining tabs.



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Step 1: Pull upper section of bottom pan
Step 2: Lift front of secondary air intake silencer
Step 3: Unlatch retaining tabs

Pull air filter out of secondary air intake silencer.

Air Filter Cleaning

Clean with fresh water and mild soap.

Replace air filter as required.

NOTE: If the filter is very dirty, clean the interior of secondary air intake silencer at the same time.

Air Filter Installation

The installation is the reverse of the removal procedure.

PRIMARY AIR INTAKE SILENCER

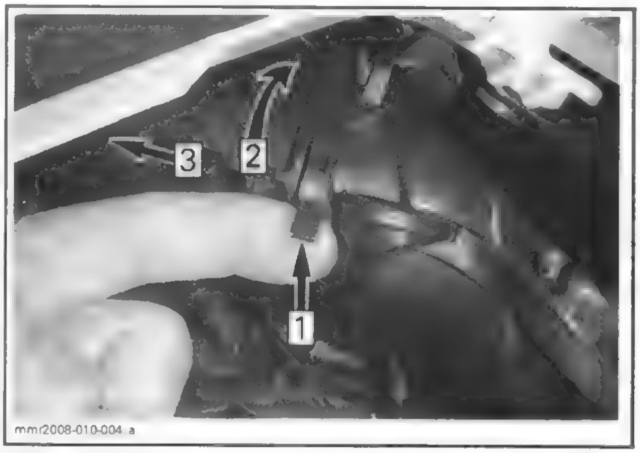
Primary Air Intake Silencer Removal

Remove LH side panel.

Remove drive belt guard, refer to *DRIVE BELT*.

Unlock connector tube **no. 3** as follows:

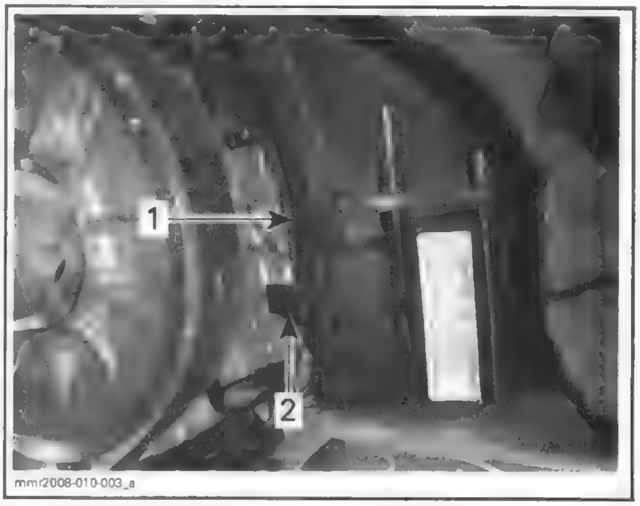
- Lift tab on rear section of connector tube.
- Twist tube counter clockwise and pull slightly forward.



mmr2008-010-004_a

Step 1: Lift tab
Step 2: Twist tube
Step 3: Pull forward

Push securing tab of primary air intake silencer **no. 2** and pull silencer out of adapter plate **no. 5**.



mmr2008-010-003_a

1. *Primary air intake silencer*
2. *Securing tab*

Primary Air Intake Silencer Installation

The installation is the reverse of the removal procedure. However, pay attention to guide the primary air intake silencer into the adapter plate's groove. Also make sure that the primary air silencer is pushed to the end of adapter plate and that the securing tab is fully engaged.

SECONDARY AIR INTAKE SILENCER

Secondary Air Intake Silencer Removal

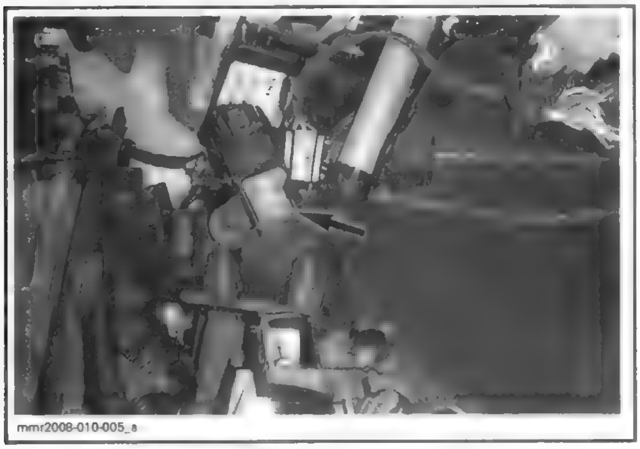
Remove multifunction gauge, refer to *LIGHTS/GAUGE/ACCESSORIES*.

Refer to body and remove:

- Hood
- LH and RH side panels
- Bottom pan cover
- Gauge support and headights as a unit
- Slightly move console aside without disconnecting cables.

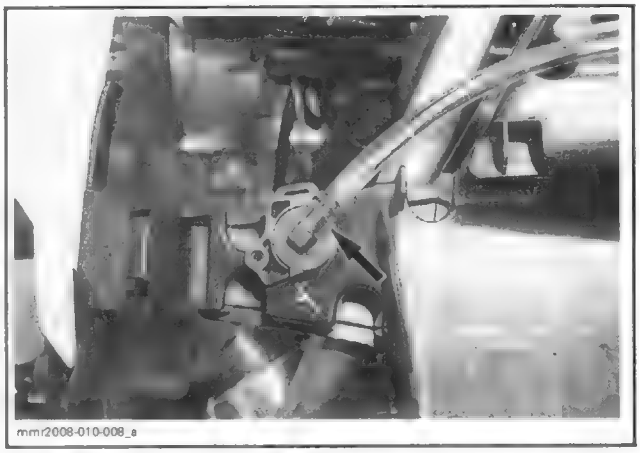
600 HO SDI Models

Disconnect air pressure sensor (APS) located on LH top of secondary air intake silencer.



500SS and 800R Models

Unplug vent hose.



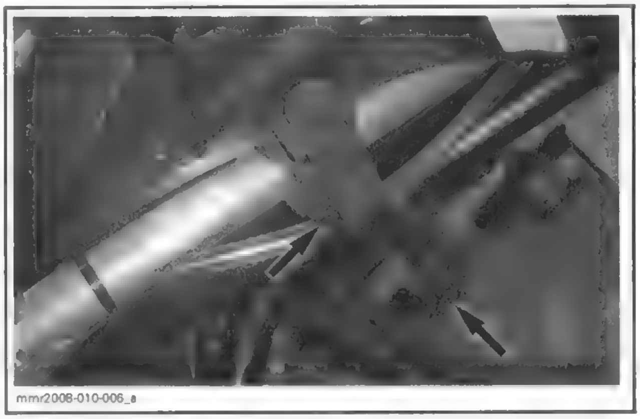
600 HO SDI and 800R Models

Disconnect air temperature sensor (ATS) located on top of connector tube.

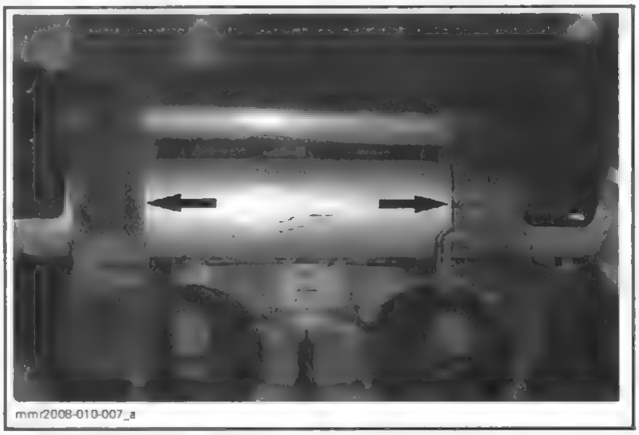
All Models

Unlock connector tube as described in *PRIMARY AIR INTAKE SILENCER REMOVAL*.

Pull off all 4 Velcro straps located on the lower portion of the secondary air intake silencer.



TYPICAL — REAR VELCRO STRAP

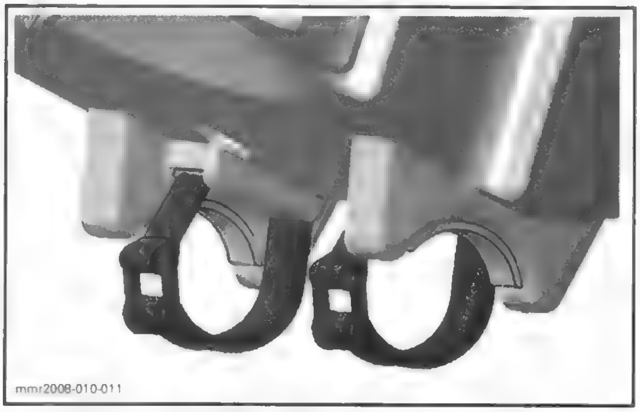


FRONT VELCRO STRAPS

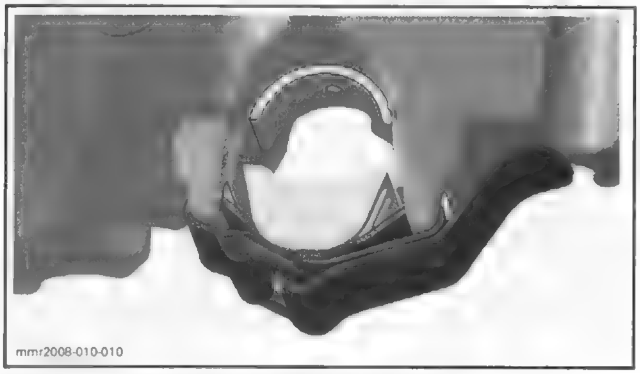
Remove secondary air intake silencer.

Secondary Air Intake Silencer Installation

The installation is the reverse of the removal procedure. However, pay attention to the velcro straps routing for proper installation.



FRONT VELCRO STRAPS ROUTING



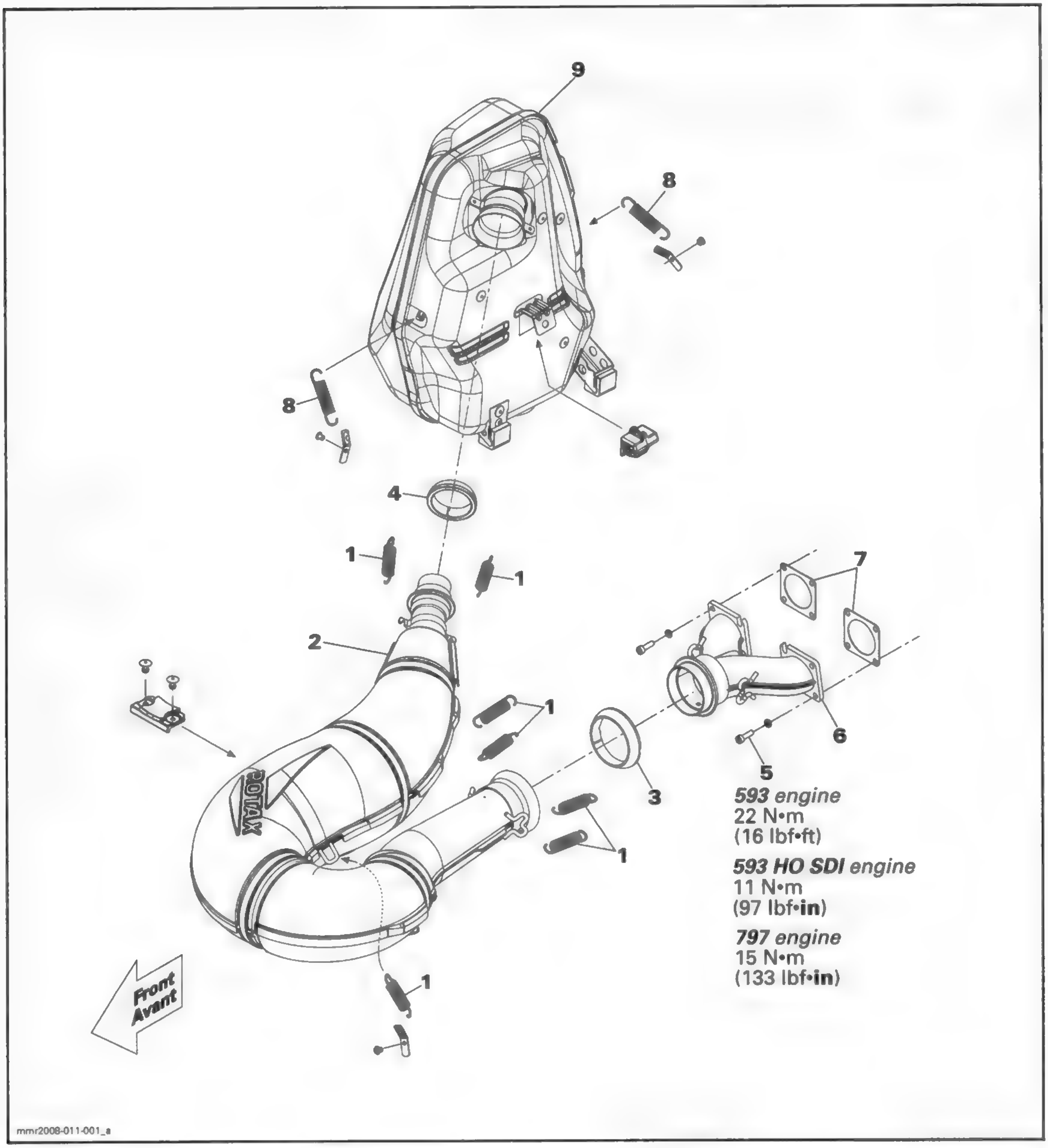
TYPICAL — REAR VELCRO STRAP ROUTING

IMPORTANT: Do not forget to reconnect the APS (or the vent hose) and the ATS where applicable.

EXHAUST SYSTEM

SERVICE TOOLS

Description	Part Number	Page
exhaust spring installer/remover	529 035 401	56–57



***593** engine*
22 N•m
(16 lbf•ft)

***593 HO SDI** engine*
11 N•m
(97 lbf•**in**)

***797** engine*
15 N•m
(133 lbf•**in**)

mmr2008-011-001_a

GENERAL

⚠ WARNING

To avoid potential burns, never touch exhaust system components immediately after the engine has been running because these components are very hot. Let engine and exhaust system cool down before performing any servicing.

During assembly/installation, use the torque value and service products as in the exploded view.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.) must be replaced with new ones.

NOTE: On applicable models, it is good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to *EMS DIAGNOSTIC AND COMMUNICATION TOOLS*.

PROCEDURES

TUNED PIPE

Tuned Pipe Removal

Refer to *BODY* and remove:

- Right hand side panel
- Hood
- Bottom pan cover.

Remove exhaust springs **no. 1**. Use exhaust spring installer/remover (P/N 529 035 401).

Remove muffler **no. 9** (except 800R models). See procedure in this section.

Remove tuned pipe **no. 2**.

Remove exhaust gasket **no. 3** and **no. 4**.

Tuned Pipe Inspection

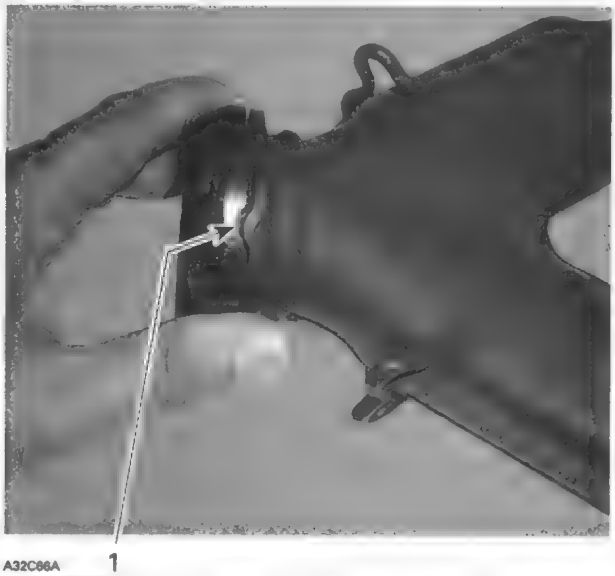
Check tuned pipe and shields for:

- Damages
- Cracks.

Also inspect gaskets condition. Replace as required.

Tuned Pipe Installation

Install doughnut shaped exhaust gasket **no. 3** with both of its notches aligned with Y-manifold protrusions.



1. *Align notches*

Install all exhaust springs using exhaust spring installer/remover (P/N 529 035 401).

MANIFOLD

Manifold Removal

Remove muffler (except 800R models). See procedure in this section.

Remove tuned pipe. See procedure in this section.

Remove manifold screws **no. 5** and discard them.

NOTE: Take note of the respective position of the socket screws and the hexagonal screws for proper installation.

CAUTION: Heat screws for 30 seconds before loosening to prevent screw breakage.

Remove manifold.

Remove gaskets **no. 7**.

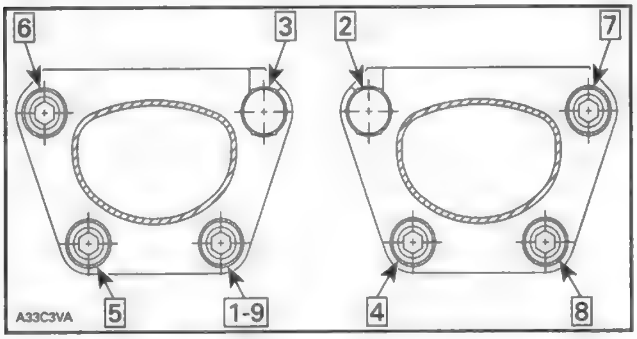
Manifold Inspection

Check if the manifold is cracked or damaged. Replace if necessary.

Manifold Installation

Install the manifold with new gaskets.

Install new manifold screws **no. 5** and torque them to specification.



SEQUENCE

ENGINE	TORQUE
593	22 N•m (16 lbf•ft)
593 HO SDI	11 N•m (97 lbf•**in**)
797	15 N•m (132 lbf•**in**)

Install tuned pipe.

Install muffler.

MUFFLER

Muffler Removal

Remove right hand side panel.

Remove tuned pipe.

Disconnect the EGTS (Exhaust Gas Temperature Sensor) on **SDI models**.

Remove springs **no. 8** retaining the muffler. Use exhaust spring installer/remover (P/N 529 035 401).

Remove the muffler.

Muffler Inspection

Check the muffler for cracks or other damages.

Muffler Installation

For installation, reverse the removal procedure.

EXHAUST GAS TEMPERATURE SENSOR (EGTS)

Refer to *ELECTRONIC FUEL INJECTION (EFI)* section to verify or change the EGTS.

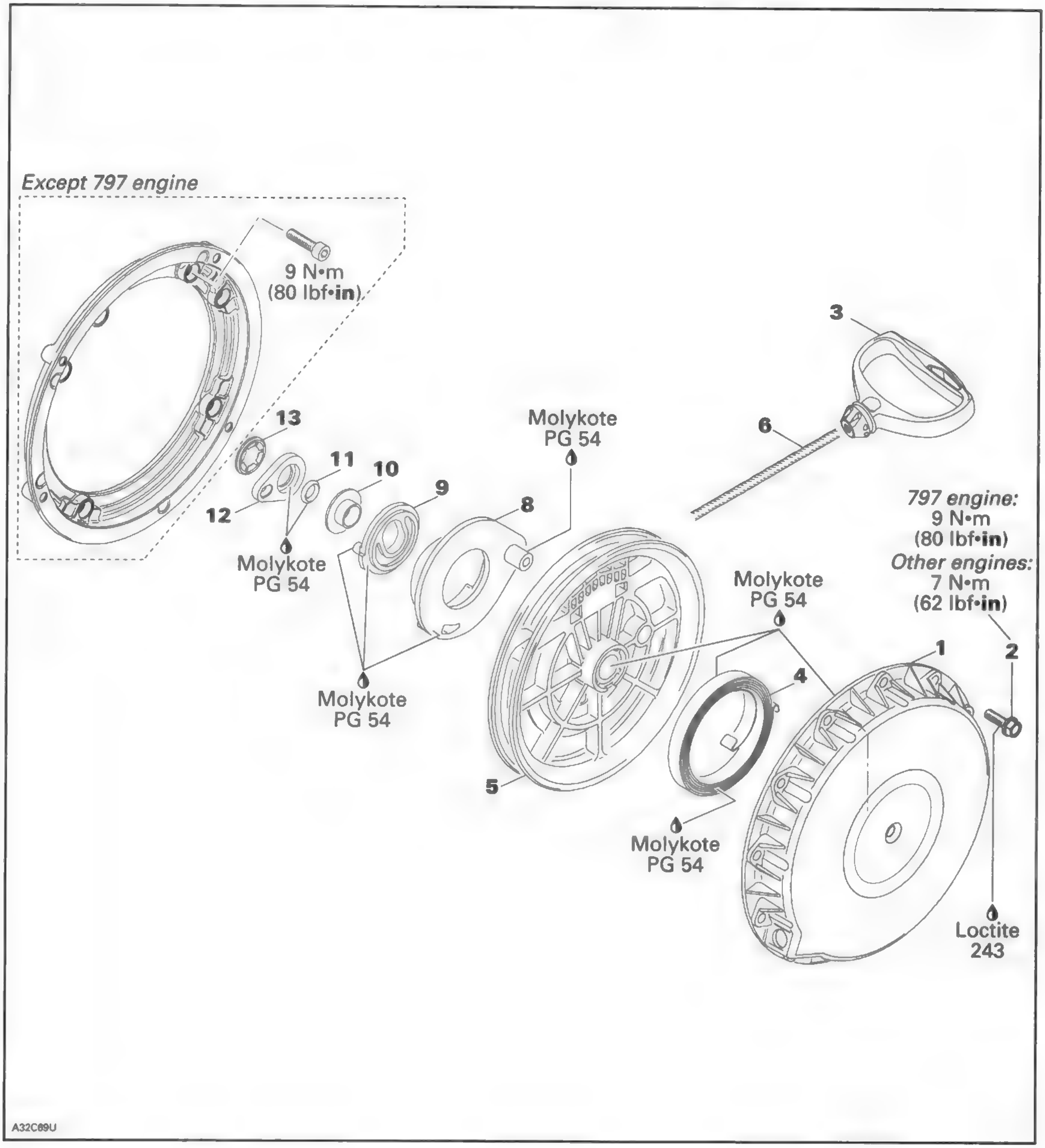
REWIND STARTER

SERVICE TOOLS

Description	Part Number	Page
small hose pincher	295 000 076	61

SERVICE PRODUCTS

Description	Part Number	Page
Molykote PG 54	420 899 763	62–63


Except 797 engine
9 N•m
(80 lbf•in)
3
13
Molykote
PG 54
6
11
10
9
8
12
797 engine:
9 N•m
(80 lbf•in)
Other engines:
7 N•m
(62 lbf•in)
Molykote
PG 54
Molykote
PG 54
1
2
4
Molykote
PG 54
5
Molykote
PG 54
Loctite
243
A32C69U

GENERAL

NOTE: Due to dust accumulation, rewind starter must be periodically cleaned, inspected and relubricated.

CAUTION: It is of the utmost importance that the rewind starter spring be lubricated periodically using specific lubricant. Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Check if rope **no. 6** is fraying, replace if so.

When pulling starter grip, mechanism must engage within 30 cm (1 ft) of rope pulled. If not, disassemble rewind starter, clean and check for damaged plastic parts. Replace as required, lubricate, reassemble and recheck. Always replace O-ring **no. 11** every time rewind starter is disassembled.

When releasing starter grip, it must return to its stopper and stay against it. If not, check for proper spring preload or damages. Readjust or replace as required.

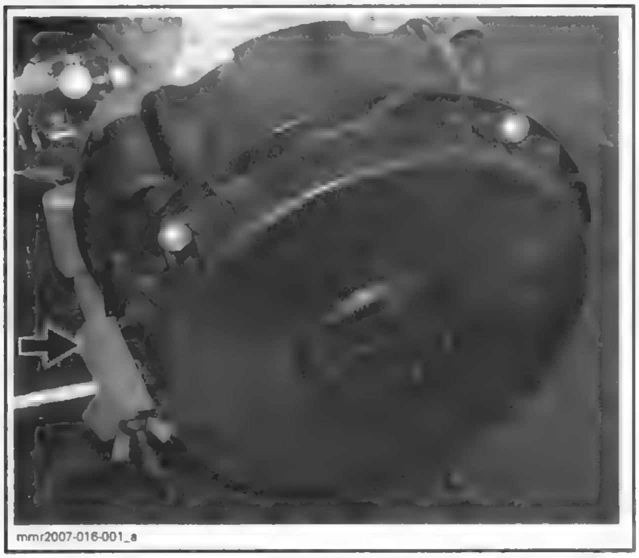
When pulling starter grip 10 times in a row, it must return freely. If not, check for damaged parts or lack of lubrication. Replace parts or lubricate accordingly.

PROCEDURES

REWIND STARTER HANDLE

Rewind Starter Handle Removal

Pull rope for 50 cm (20 in) approximately. Using a small hose pincher (P/N 295 000 076), lock rope near rewind starter.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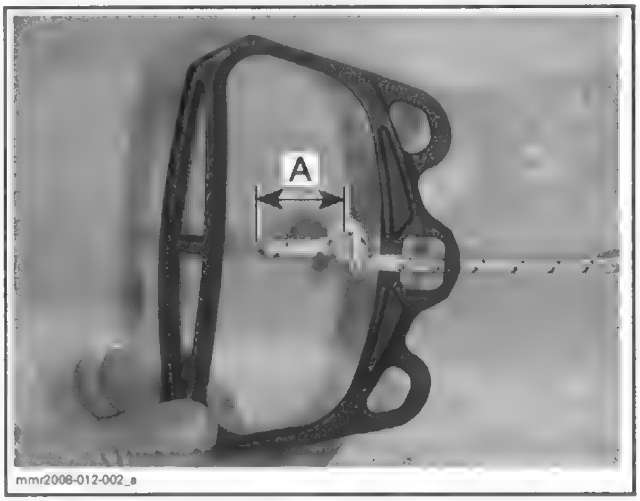
Using a small screwdriver, extract rope knot from stater handle **no. 3**. Cut rope close to knot.

Rewind Starter Handle Installation

Prior to installing starter handle on rope, it is first necessary to fuse the rope end with a lit match. Pass rope through starter handle and tie a knot in the rope end, see picture.



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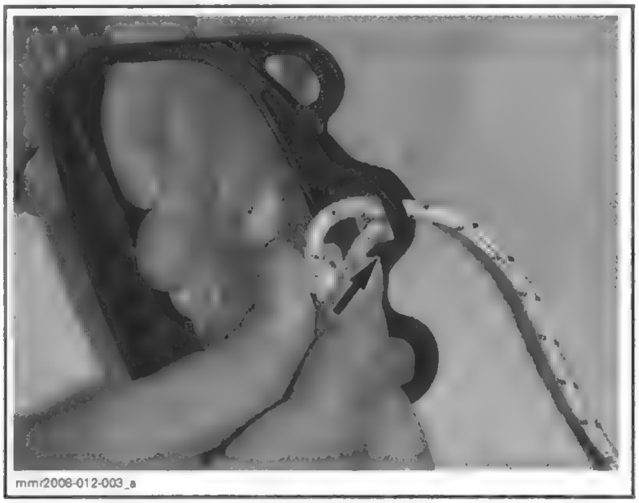
A. 30 ± 5 mm (1 ± 1/4 in)

Fuse the knot with a lit match then insert rope end down and pull the starter handle over the knot.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REWIND STARTER

Rewind Starter Removal

Remove the following parts:

- Muffler
- Acoustic panel.

Remove starter handle **no. 3**.

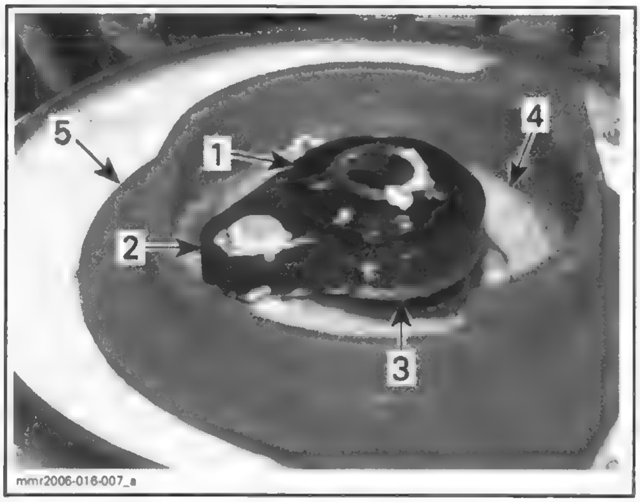
Remove screws **no. 2** securing rewind starter **no. 1** to engine then remove rewind starter.

Rewind Starter Disassembly

Remove the hose pincher previously installed on rope at rewind starter removal. Let sheave get free to release spring preload.

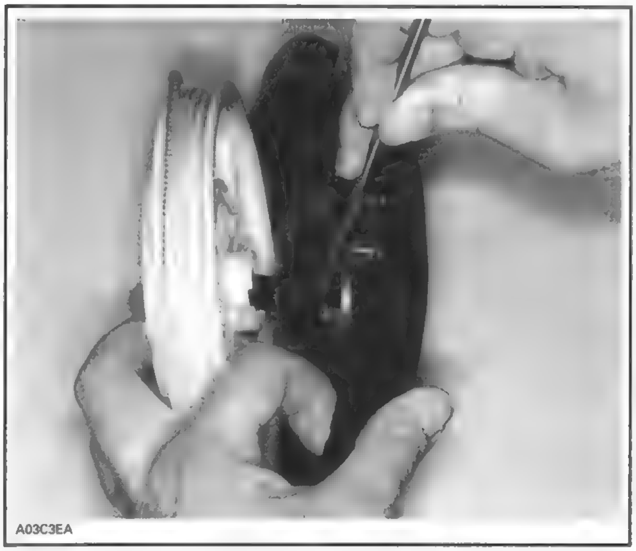
Cut push nut and discard.

Remove lock lever, O-ring **no. 11**, collar sleeve, pawl lock and pawl.



1. Push nut
2. Lock lever
3. Collar sleeve
4. Pawl lock
5. Pawl

Remove sheave **no. 5** from starter housing **no. 1**. Hold spring with a screwdriver.



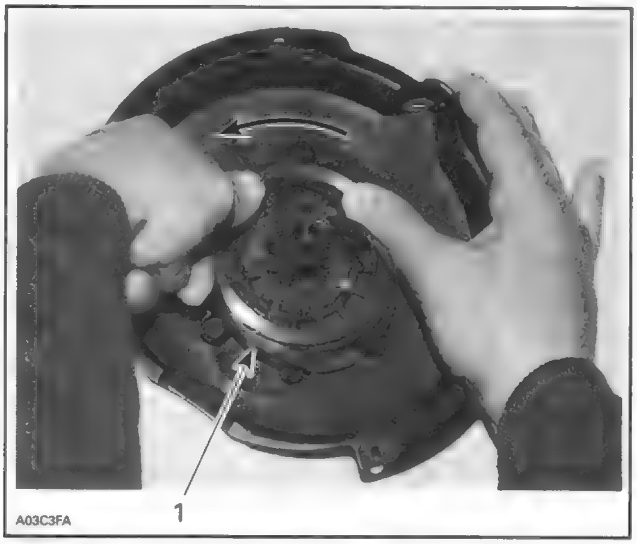
Take out the knot and then rope **no. 6**.

Rewind Starter Assembly

At assembly, position spring **no. 4** outer end into spring guide notch then wind the spring counterclockwise into guide.

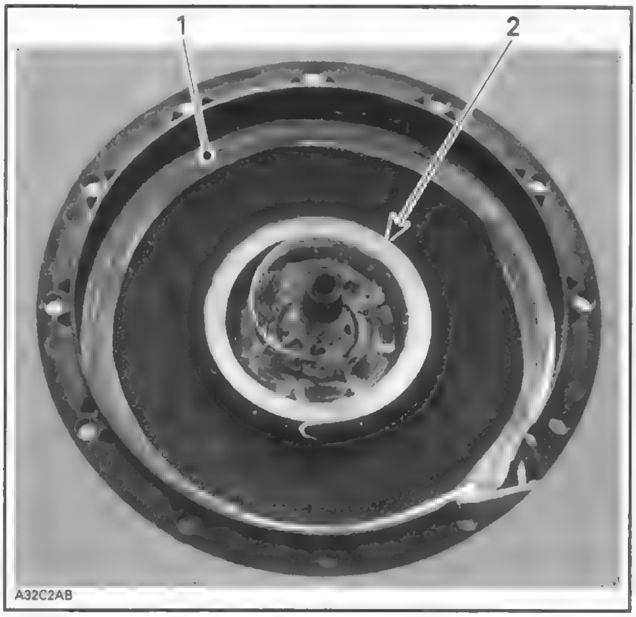
⚠ WARNING

Since the spring is tightly wound inside the guide it may fly out when rewind is handled. Always handle with care.



TYPICAL
1. *Outer end into guide notch*

Lubricate spring assembly and 1 cm (1/2 in) wide on bottom of housing with Molykote PG 54 (P/N 420 899 763).



1. *Molykote PG 54 applied 1 cm (1/2 in) wide on bottom of housing*
2. *Molykote PG 54 inside spring guide*

CAUTION: It is of the utmost importance that the rewind starter spring be lubricated periodically using Molykote PG 54 (P/N 420 899 763). The use of standard multipurpose grease could result in rewind starter malfunction under very cold temperatures and components life will be shortened.

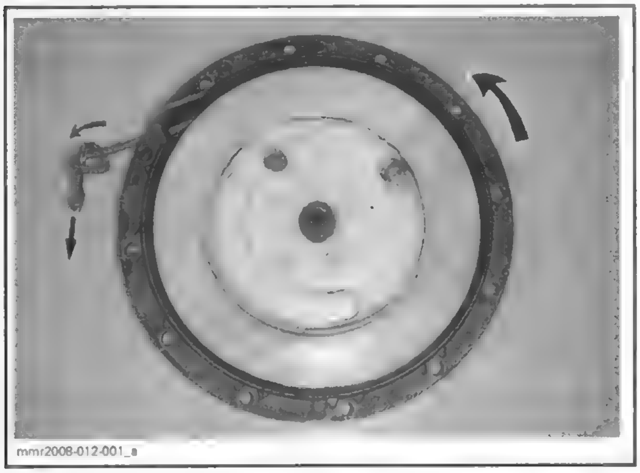
Lubricate housing post with silicone compound grease. Install sheave.

To adjust spring tension:

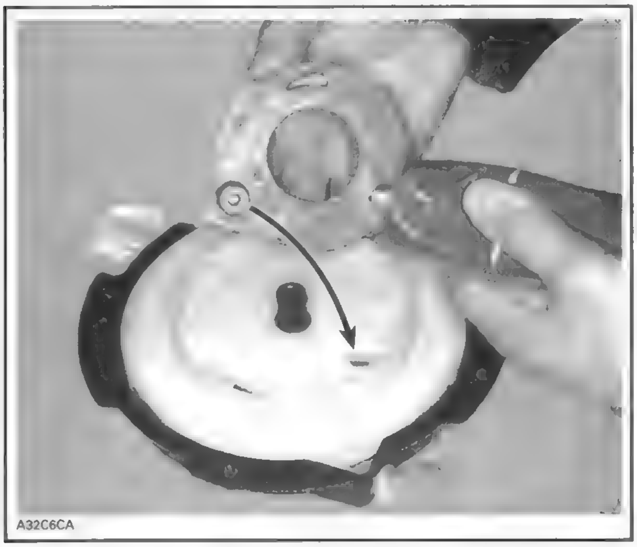
Wind rope on sheave and place rope sheave into starter housing making sure that the sheave hub notch engages in the rewind spring hook.

Rotate the sheave counterclockwise until rope end is accessible through rope exit hole. This will give 1/2 turn of preload.

Pull the rope out of the starter housing and temporarily make a knot to hold it.

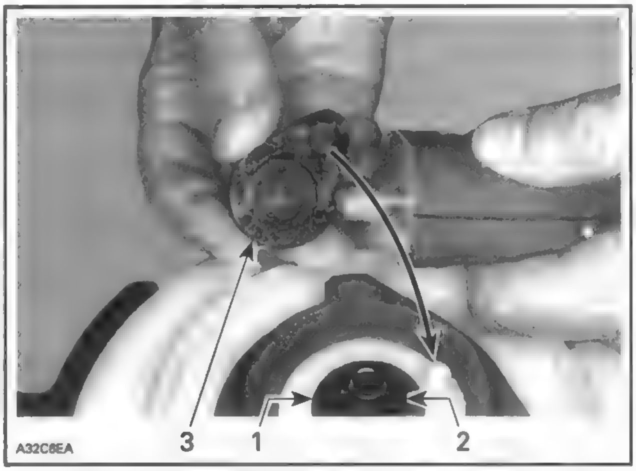


Lubricate pawl **no. 8** with Molykote PG 54 (P/N 420 899 763) then install over rope sheave.



Lubricate pawl lock **no. 9** with Molykote PG 54 (P/N 420 899 763). Install over pawl.

Install collar sleeve **no. 10** with its collar first. Lubricate a new O-ring **no. 11** and lock lever **no. 12** with Molykote PG 54 (P/N 420 899 763). Install over pawl lock.



1. *Collar sleeve*
2. *O-ring*
3. *Lock lever*

Position a new push nut **no. 13**.

Rewind Starter Installation

Thread starter rope **no. 6** through console.

Install handle, refer to *STARTER HANDLE INSTALLATION*.

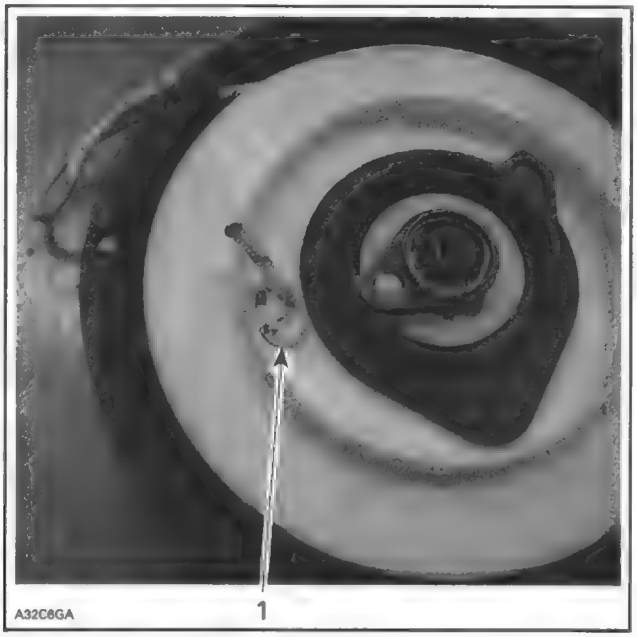
Reinstall rewind starter assembly on engine.

ROPE

Rope Replacement

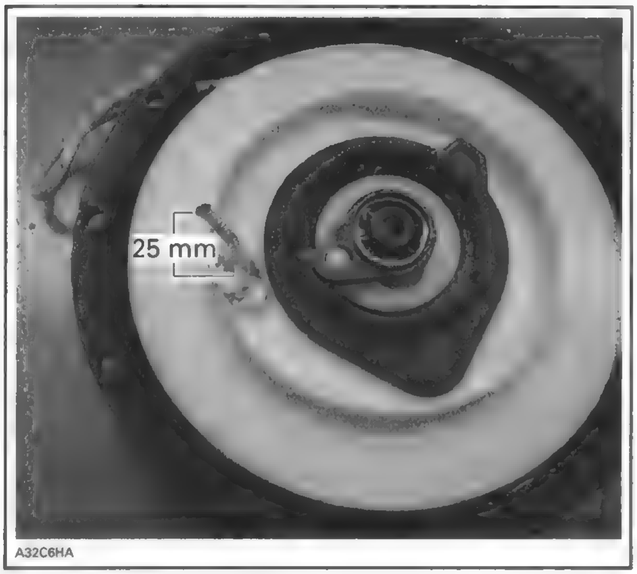
Remove rewind starter.

Completely pull out rope. Hold rewind starter in a vise. Slide rope and untie the knot. Pull out the rope completely.



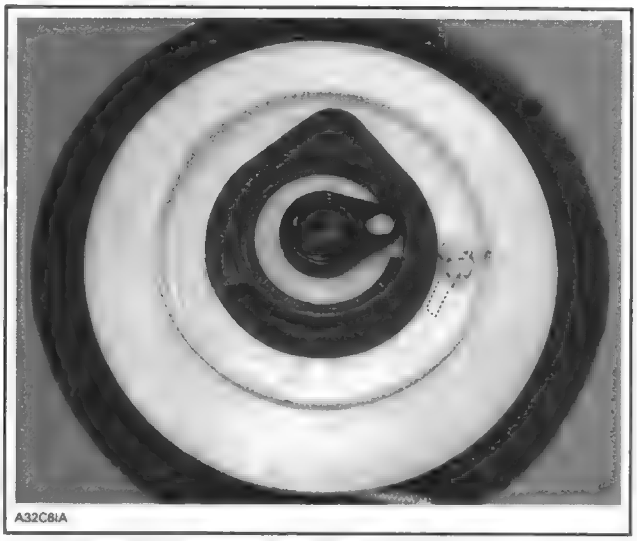
1. Knot to be untied

To install rope **no. 6**, insert rope into sheave **no. 5** orifice and lock it by making a knot, leaving behind a free portion of about 25 mm (1 in) in length.



FREE PORTION

Fuse rope end with a lit match and insert it into sheave.



FREE PORTION INSERTED INTO SHEAVE

NOTE: When rope is completely pulled out, spring preload is 4-1/2 turns.

LUBRICATION SYSTEM

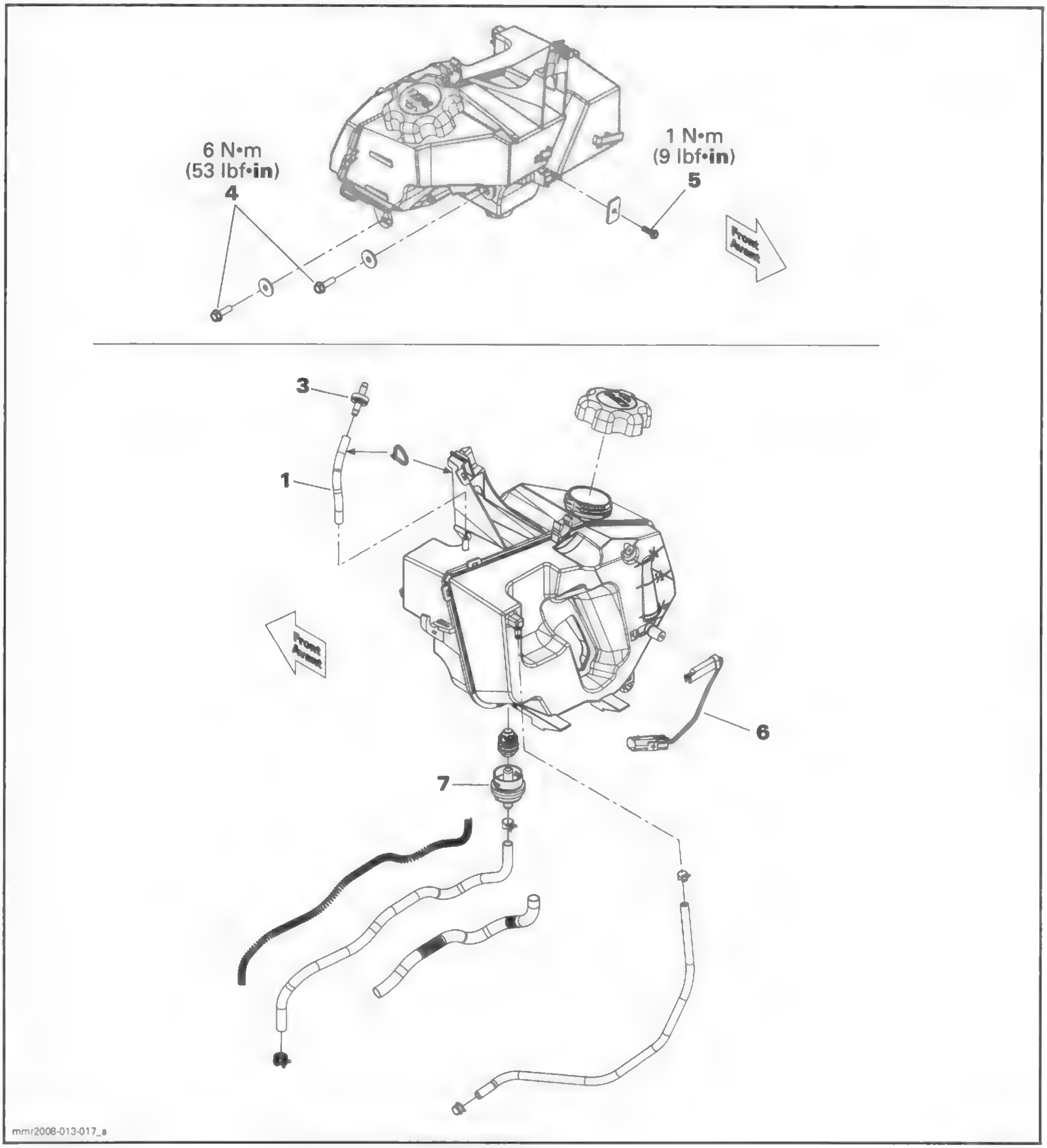
SERVICE TOOLS

Description	Part Number	Page
small hose pincher	295 000 076	68–69
vacuum/pressure pump	529 021 800	69, 75
leak testing kit	529 033 100	68
engine removal hook	529 035 829	73
spark plug lift ring	529 035 830	73
Fluke 111 multimeter	529 035 868	71
throttle free play wedge tool	529 036 042	74
oil pump cable adjuster	529 036 045	74

SERVICE PRODUCTS

Description	Part Number	Page
Loctite 243 (blue)	293 800 060	73
Loctite 648 (green)	413 711 400	76
pulley flange cleaner	413 711 809	76

OIL INJECTION RESERVOIR


6 N•m
(53 lbf•in)
4
1 N•m
(9 lbf•in)
5
Front
Avant
3
1
Front
Avant
6
7
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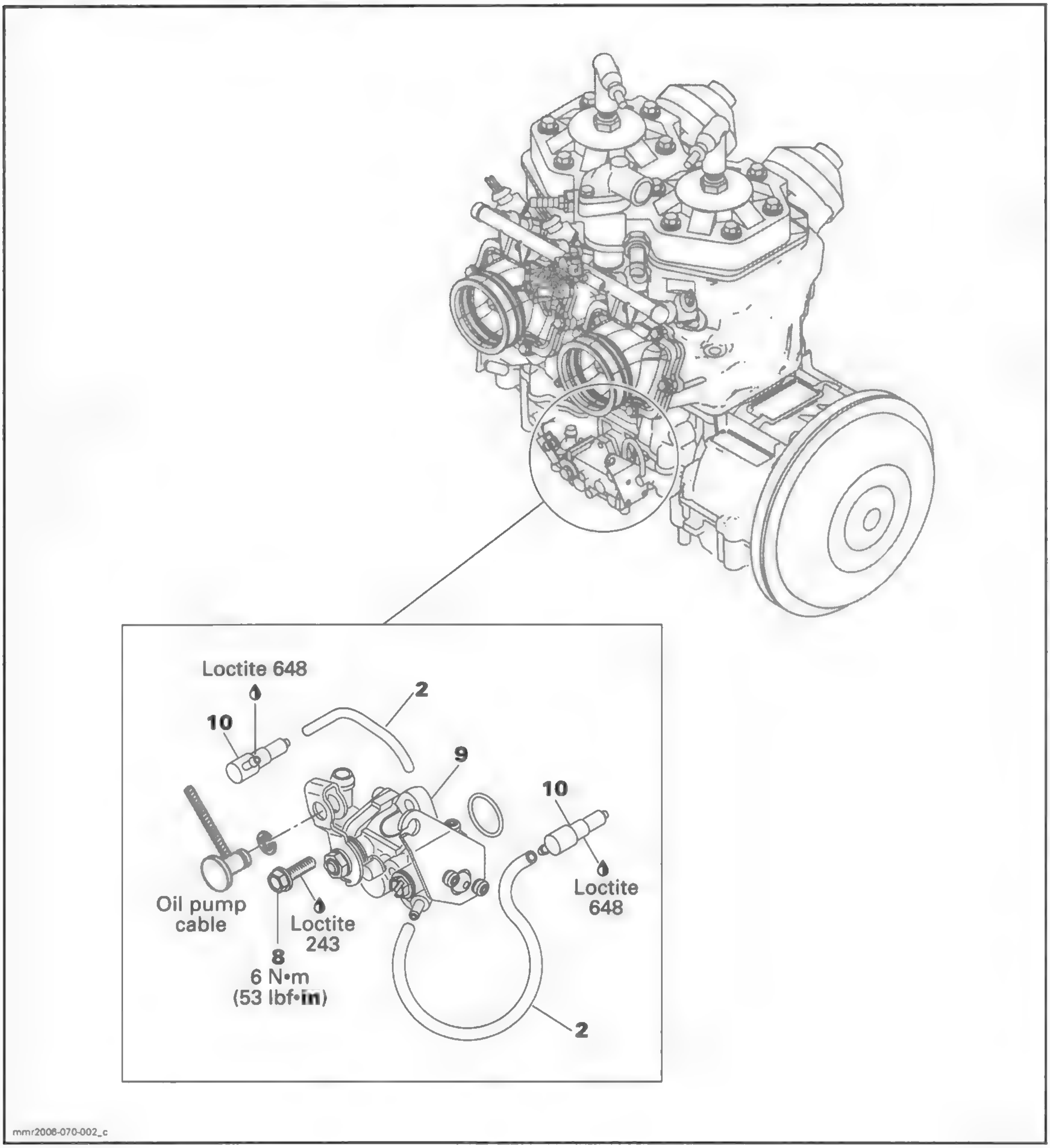
OIL INJECTION PUMP


Loctite 648
2
10
9
10
Oil pump cable
Loctite 243
8
6 N•m
(53 lbf•in)
Loctite 648
2
mmr2008-070-002_c

GENERAL

During assembly/installation, use the torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be replaced with new ones

⚠ WARNING

Wipe off any oil spills. Oil is highly flammable.

CAUTION: Do not use a hose pincher on outlet hose. This would damage the spring inside hose.

OIL TYPE

RECOMMENDED INJECTION OIL			
ENGINES	XP-S mineral injection oil (4)	XP-S synthetic blend (2) (3)	XP-S synthetic oil (2) (3)
500SS	✓	✓	✓
600 HO SDI	—	✓ (1)	✓
800R Power TEK	—	✓ (1)	✓

(1) Prefered.

CAUTION: (2) XP-S synthetic oil and XP-S synthetic blend oil are specially formulated and tested for the severe requirements of these engines. Use of any other brand two-stroke oil may void the limited warranty. Use only XP-S synthetic oil or XP-S synthetic blend. There is no known equivalent on the market for the moment. If a high quality equivalent were available, it could be used.

(3) XP-S synthetic oil and XP-S synthetic blend injection oil are compatible, they can be mixed together.

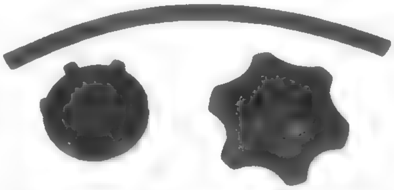
(4) If not available, API TC high-quality low ash two-stroke injection oil may be used.

INSPECTION

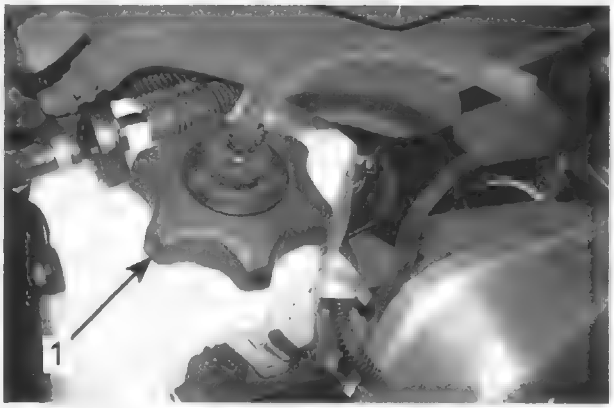
OIL SYSTEM LEAK TEST

The following test will indicate any leak from oil injection system.

Install on oil reservoir special cap from the leak testing kit (P/N 529 033 100).

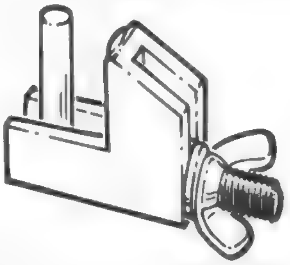


529 033 100

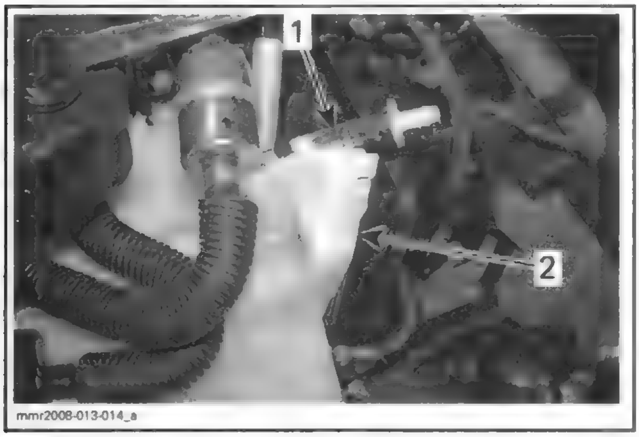


TYPICAL
1. Special cap on reservoir

Install a small hose pincher (P/N 295 000 076) on check valve outlet hose **no. 1**.



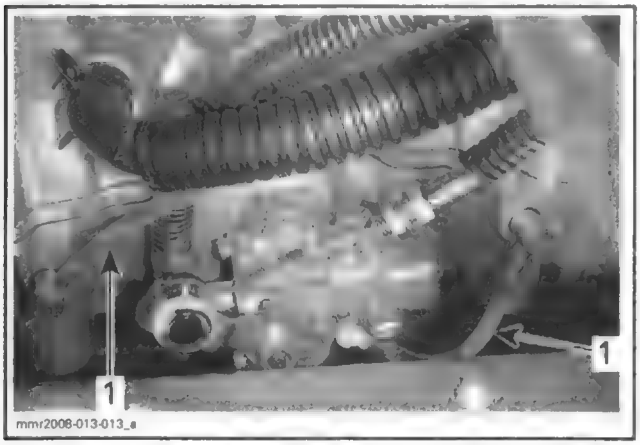
295 000 076



TYPICAL
1. *Check valve outlet hose*
2. *Oil reservoir*

To gain access to oil pump outlet hoses **no. 2**, engine must be lifted. Refer to *OIL INJECTION PUMP REMOVAL* in this section for procedure.

Install a small hose pincher (P/N 295 000 076) on each outlet hoses.



1. *Install hose pinchers here*

Connect the vacuum/pressure pump (P/N 529 021 800) to special cap.

Pressurize oil system as follows.

PRESSURE	TIME TO HOLD PRESSURE
21 kPa (3 PSI)	3 minutes

If pressure drops, locate leak(s) and repair/replace leaking component(s).

NOTE: An oil pump shaft test must be done to complete the oil system leak test. Refer to *ENGINE LEAK TEST* section.

When leak test procedure is completed, reinstall all previously removed parts.

Check Valve Test

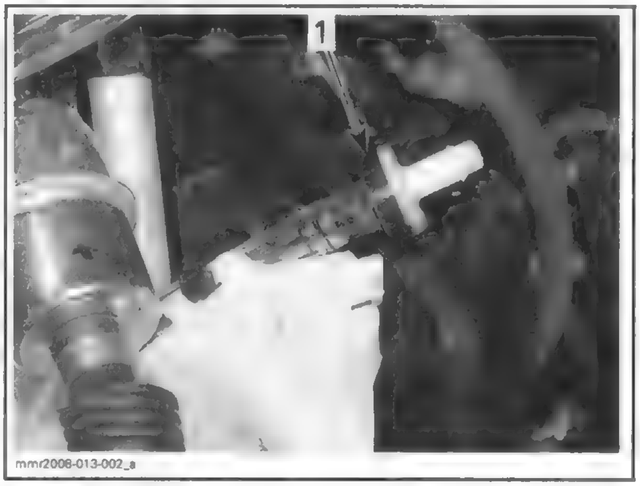
Check valve **no. 3** allows air to get into the reservoir.

To verify this one-way check valve, cut locking tie then remove it along with the hose. Make sure that it holds pressure and that it does not let air go through.

NOTE: Remember hose position.

CAUTION: If check valve does not allow air to enter, serious engine damage will occur.

When replacing/installing check valve, insert its black side into vent line.



TYPICAL
1. *Black side here*

PROCEDURES

OIL RESERVOIR

Oil Reservoir Removal

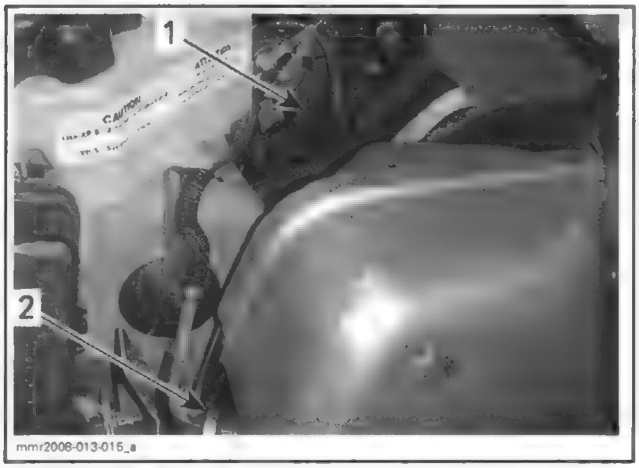
Open and remove RH side panel.

Remove console. Refer to *BODY* system.

Empty oil reservoir by siphoning injection oil.

Unplug EGT sensor wire (600 HO SDI).

NOTE: Remember wire routing.

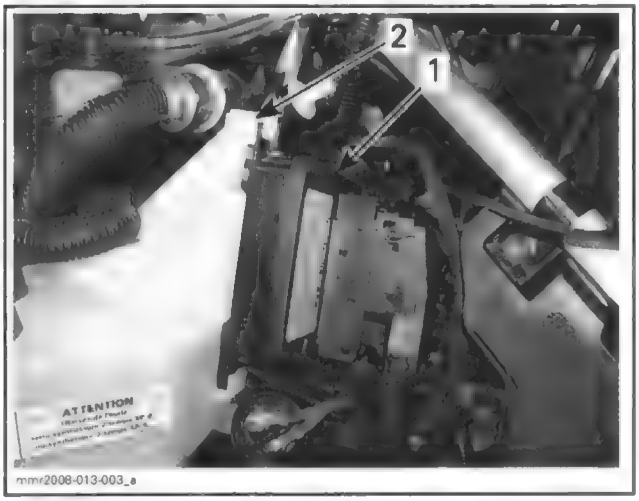

1
2
mmr2008-013-015_a

600 HO SDI ONLY
1. *connector*
2. *EGT sensor*

Remove muffler. Refer to *EXHAUST SYSTEM* section.

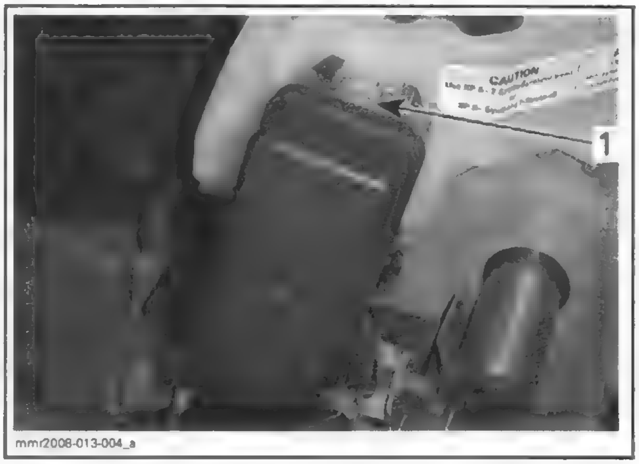
Detach from reservoir:

- Fuel regulator hose (top of reservoir) (600 HO SDI)
- Engine Control Module (ECM)


2
1
ATTENTION
mmr2008-013-003_a

TYPICAL
1. *ECM*
2. *Push on tab to release*

- Fuses or fuse box (depending on model)

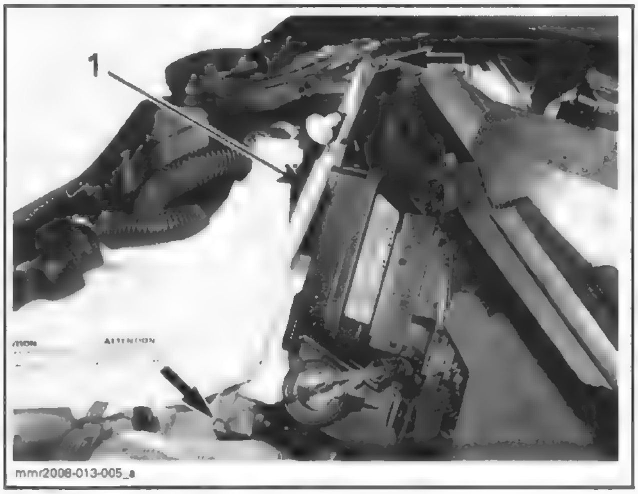

CAUTION
1
mmr2008-013-004_a

TYPICAL — 600 HO SDI ONLY
1. *Lift tab to release*

- Oil level sensor. See procedure further.

Remove upper column support behind reservoir.

NOTE: Remember parts position.

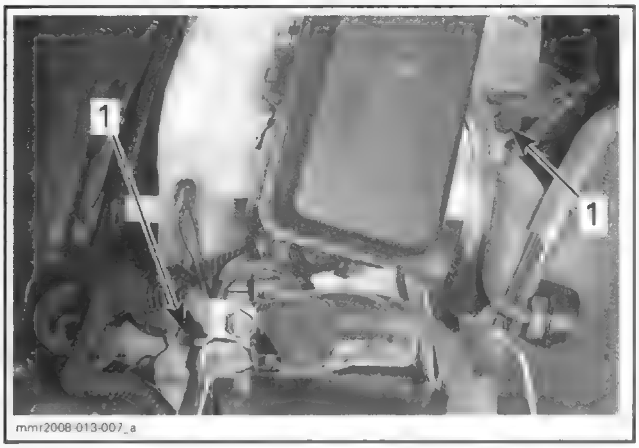

1
ATTENTION
mmr2008-013-005_a

TYPICAL
1. *Support*

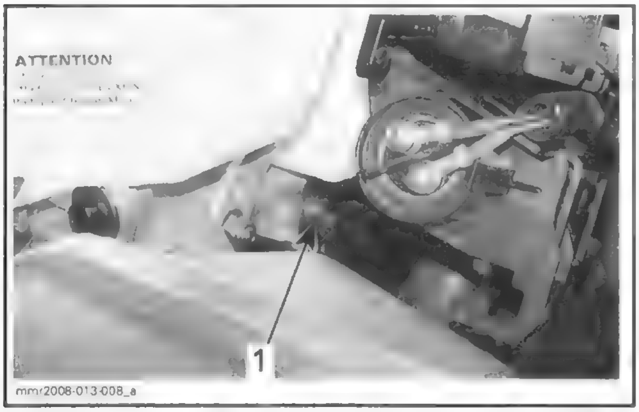
Remove rewind starter handle housing. Refer to *BODY* section.

Remove rewind starter handle. Refer to *REWIND STARTER* section.

Remove reservoir fasteners **no. 4** and **no. 5**.



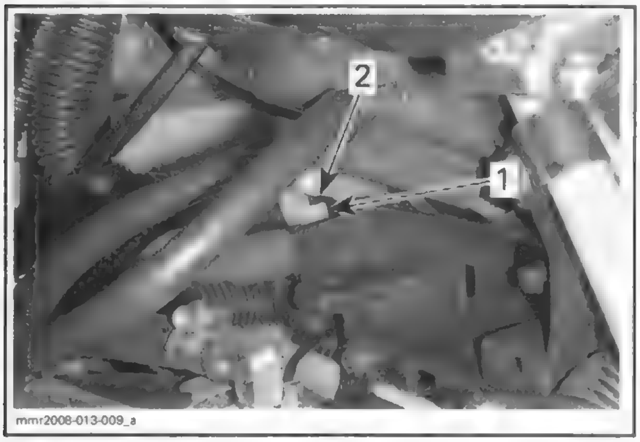
TYPICAL
1. Fasteners no. 4



TYPICAL
1. Fastener no. 5

Detach connectors from underneath reservoir.

Unhook harness behind reservoir.



TYPICAL
1. Hook behind reservoir
2. Harness

Lift reservoir and unplug all hoses.

Remove reservoir from vehicle.

Oil Reservoir Installation

For installation, reverse the removal procedure. However, pay attention to the following details.

Torque upper column support bolts to 14 N•m (10 lbf•ft).

Bleed oil pump. See procedure further.

OIL LEVEL SENSOR

Oil Level Sensor Test

Measure resistance of the oil level sensor using a Fluke 111 multimeter (P/N 529 035 868).

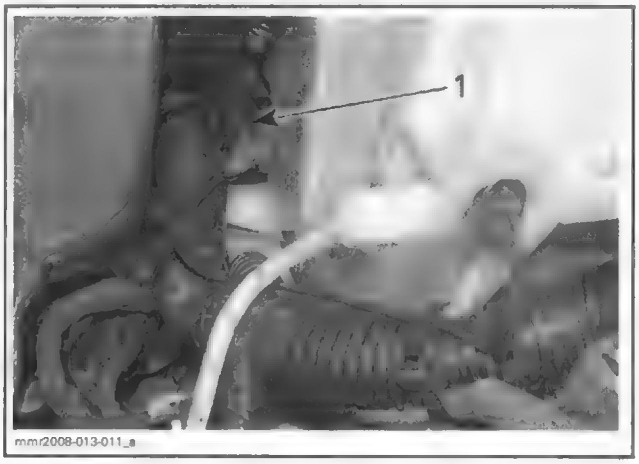
SENSOR POSITION	RESISTANCE
Sensor exposed to air	High value or infinite (0L)
Sensor soaked in oil	0.2 Ω (closed)

If resistance test fails, replace sensor.

Oil Level Sensor Removal

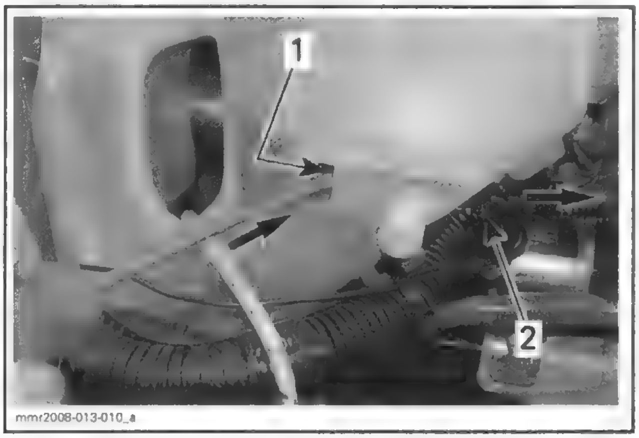
Remove rewind starter handle housing. Refer to *BODY* section.

Unplug oil level sensor connector.



1. Connector

Using a small screwdriver, push and hold tab to release then pull on sensor **no. 6** to remove.

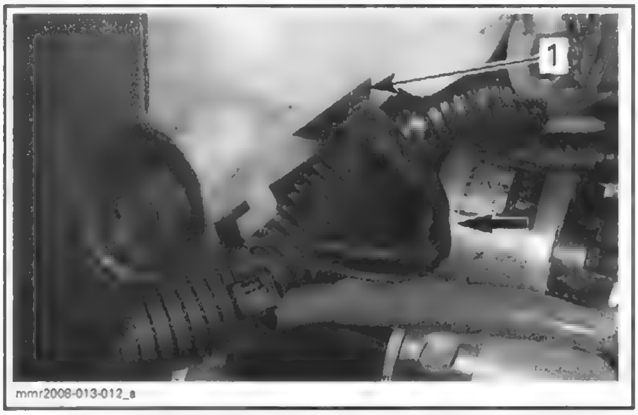


1. *Tab*
2. *Sensor*

Oil Level Sensor Installation

For installation, reverse the removal procedure. However, pay attention to the following.

Ensure sensor wire is secured with a locking tie. Ensure wire does not apply any tension on sensor. Wire must have a loop.



TYPICAL
1. *Sensor*

OIL FILTER

Oil Filter Removal

Remove oil reservoir. Refer to *OIL RESERVOIR REMOVAL* in this section.

To remove oil filter **no. 7** from reservoir, turn clockwise and pull.

Oil Filter Installation

For installation, reverse the removal procedure. However, pay attention to the following.

Bleed oil pump. See procedure further.

OIL INJECTION PUMP

Oil Injection Pump Verification

NOTE: Since pump is a piston type, it works when engine rotates in both forward and reverse.

Remove oil pump **no. 9** from engine. Refer to *OIL INJECTION PUMP REMOVAL* in this section.

Connect a hose filled with injection oil to main line fitting. Insert other hoses end in an injection oil container. Using a clockwise rotating drill, rotate pump shaft. Oil must drip from hoses while holding lever in a fully open position. If not replace pump.

Oil Injection Pump Removal

To gain access to oil pump **no. 9**, perform the following.

Remove:
- Muffler
- Engine stopper support
- Primary air intake silencer.

Refer to *ENGINE* section.

Remove:
- Belt guard
- Drive belt
- Driven pulley.

Refer to *DRIVE SYSTEM/BRAKE* section.

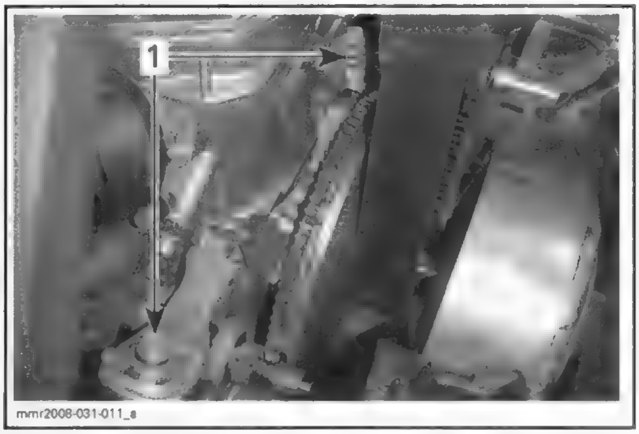
Disconnect from carburetor or throttle body:
- Coolant inlet and outlet lines
- Fuel inlet line
- TPS sensor connector (800R models).

Refer to *FUEL SYSTEM*.

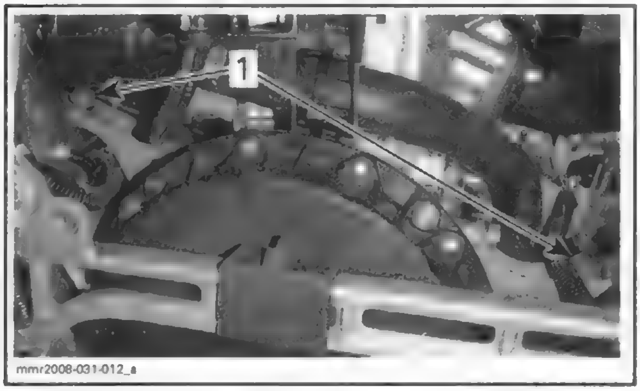
Detach carburetor or throttle body from engine.

Unscrew bolts retaining fuel pump to frame (500SS/800R).

Unscrew bolts retaining engine supports to rubber mounts.

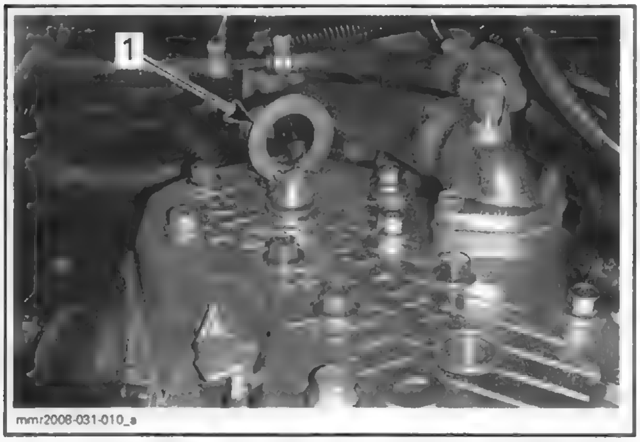


TYPICAL — PTO SIDE
1. Remove hexagonal bolts



MAG SIDE
1. Remove hexagonal bolts

Remove spark plugs and install the spark plug lift ring (P/N 529 035 830) at the farthest spark plug hole.



1. Spark plug lift ring

Install the engine removal hook (P/N 529 035 829).

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Lift engine enough to gain access to oil pump.

Remove screws **no. 8** retaining oil pump to engine.

Unplug hoses **no. 2** connected to oil pump **no. 9**.

NOTE: Mark hose locations for installation.

Disconnect oil pump cable.

Oil Injection Pump Cleaning

Clean all metal components in a non-ferrous metal cleaner.

Oil Injection Pump Installation

For installation, reverse the removal procedure. However, pay attention to the following.

During installation, always check for spring clip tightness on pump inlet hose.

Apply Loctite 243 (blue) (P/N 293 800 060) on threads of screws **no. 8** and torque them to 6 N•m (53 lbf•**in**).

Make sure cable barrel is well seated in oil pump lever.

Secure barrel with plastic washer and circlip.

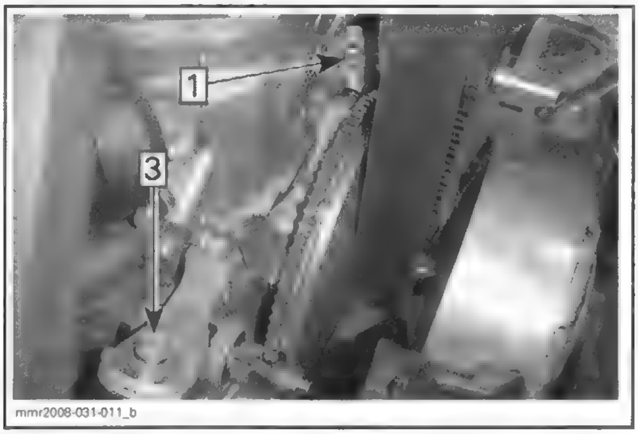
Install cable lock washer on left side of support.

Bleed oil pump. See procedure further.

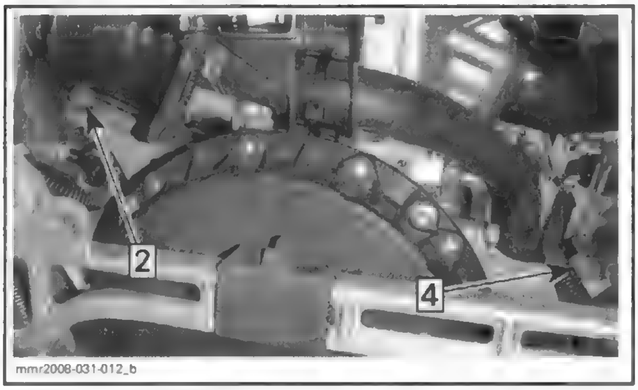
CAUTION: Always bleed oil pump when the system has been opened.

Torque fuel pump screw to 5 N•m (44 lbf•**in**).

Torque engine supports hexagonal bolt to 25 N•m (18 lbf•ft) and in the following sequence.



TYPICAL — PTO SIDE
Step 1
Step 3



TYPICAL — PTO SIDE
Step 2
Step 4

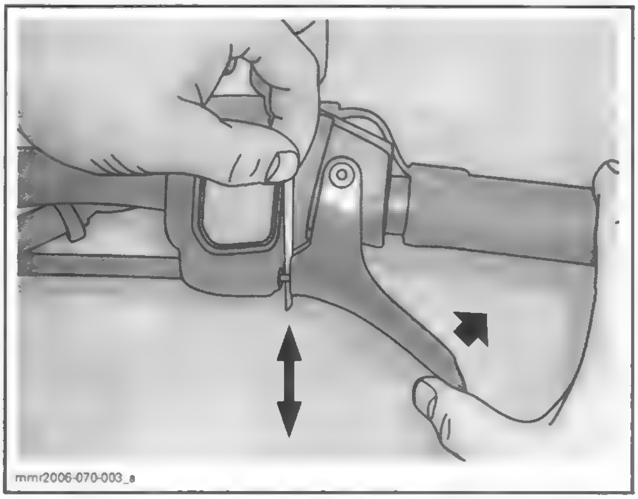
Adjust oil pump cable. See procedure further.

Oil Injection Pump Adjustment

Slightly press on throttle lever to eliminate throttle cable free play.

Insert the throttle free play wedge tool (P/N 529 036 042), between throttle lever and housing as shown.

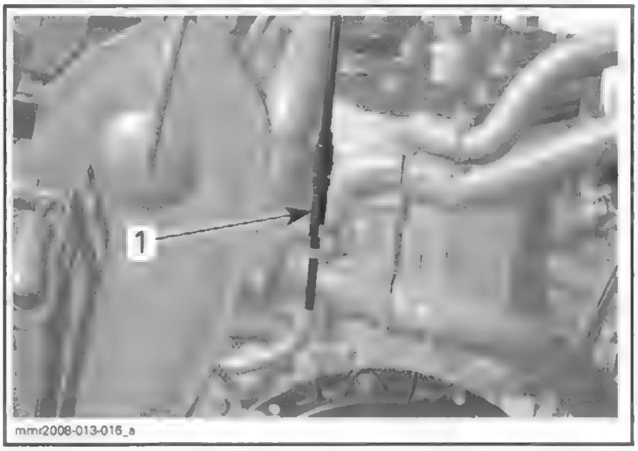
Slide tool up and down until all free-play is recovered. Stop recovering free-play before throttle cam just begins to move at carburetor/throttle body.



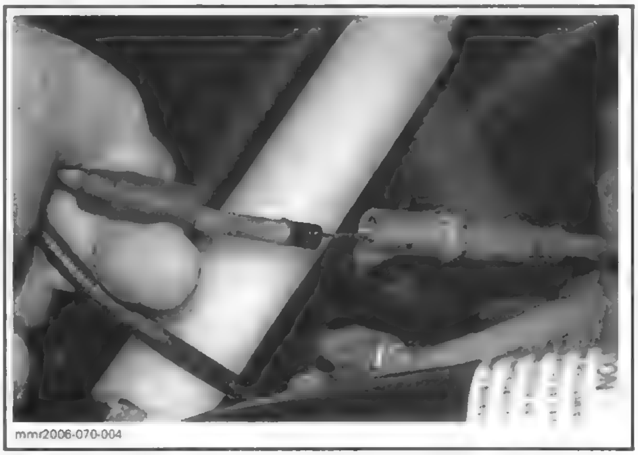
TYPICAL

CAUTION: Throttle slides must not move and remain in idle position.

Move adjuster boot away and stretch oil pump cable at adjuster.

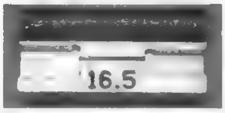
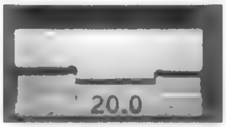


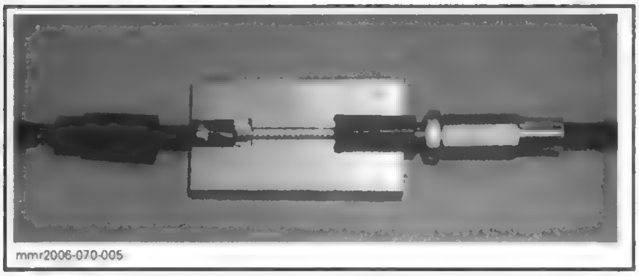
TYPICAL
1. Oil pump cable adjuster



TYPICAL

Insert cable in the appropriate slot of the oil pump cable adjuster (P/N 529 036 045).

MODEL	ADJUSTMENT SPECIFICATION	
500SS 800R	16.5 mm (.650 in)	
600 HO SDI	20.0 mm (.787 in)	



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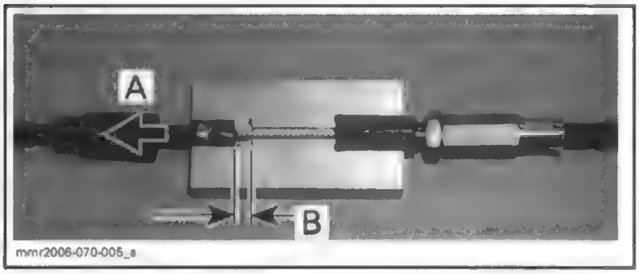
NOTE: If tool cannot be inserted, turn cable adjuster to "shorten" cable.

Pull cable with a force of 34 N (7.6 lbf) to recover all play in cable.

While still pulling, check if there is a gap as shown.



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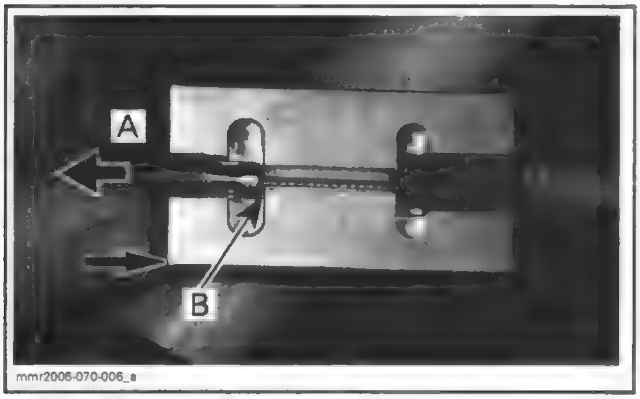
A. Pull 34 N (7.6 lbf)
B. Remove gap here

Turn cable adjuster to recover that gap.



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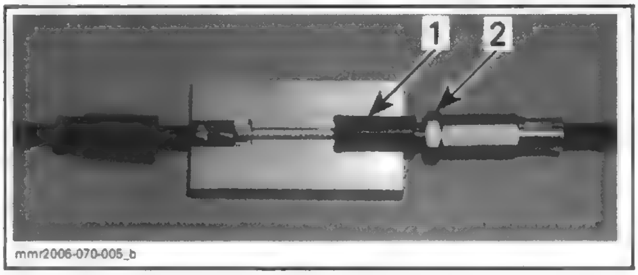
FINAL ADJUSTMENT WITHOUT GAP
A. Pull 34 N (7.6 lbf)
B. No gap

Secure adjustment in place with lock nut.



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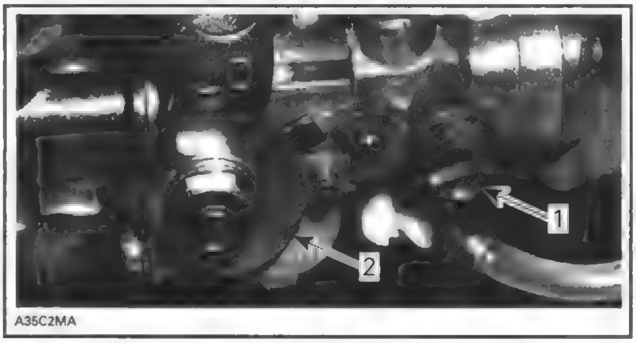
1. Cable adjuster
2. Lock nut

Remove the throttle free play wedge tool, push back cable in adjuster and slide adjuster boot in place.

Oil Injection Pump Bleeding

Bleed main oil line (between reservoir and pump) by loosening the bleeder screw until air has escaped from the line. Add injection oil as required.



A35C2MA

TYPICAL
1. Bleeder screw
2. Oil pump lever

Ensure there are no air bubbles in small oil lines between pump and engine. If so, inject oil using a syringe into lines before connecting them to engine.

INJECTION NOZZLE

Injection Nozzle Inspection

CAUTION: Do not remove injection nozzle needlessly. It is likely to be damaged.

Use the vacuum/pressure pump (P/N 529 021 800).

529 021 800

Connect pump to injection nozzle **no. 10**.

Test check valve of injection nozzle as follows.

PUMP SETTING	Set to VACUUM	Set to PRESSURE
TO DO	Activate pump several times	Slowly activate pump and listen to check valve
RESULT	Air must not flow through check valve	You should hear it release pressure at approx. 20.7 kPa (3 PSI)
ACTION	**Success:** Perform next test	**Success:** Check valve is good
	Failed: Replace injection nozzle	**Failed:** Replace injection nozzle

Injection Nozzle Removal

Remove engine from vehicle. Refer to *ENGINE* section.

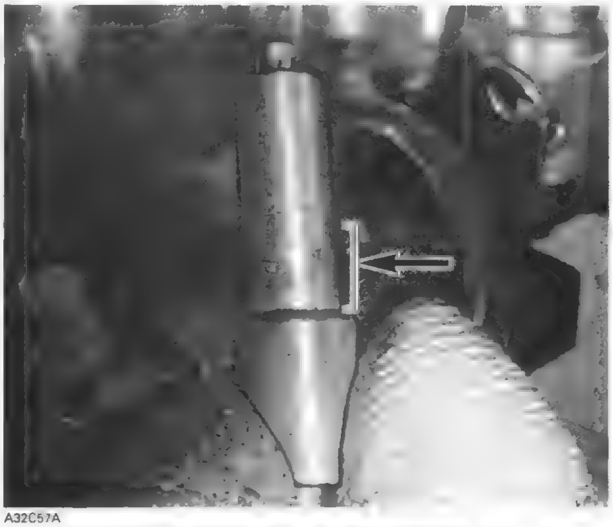
Clean injection nozzle area to remove oil or dirt.

Heat injection nozzle **no. 10** then pull it out of crankcase.

Injection Nozzle Installation

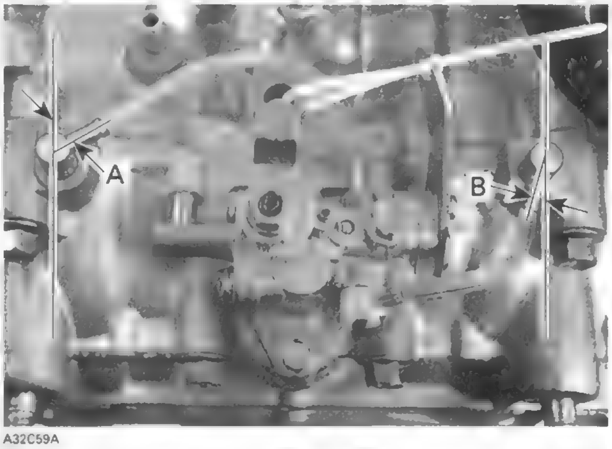
Prior to coating it with Loctite, make sure check valve body is clean and dry. Clean from dirt or oil, if any, with pulley flange cleaner (P/N 413 711 809).

Apply Loctite 648 (green) (P/N 413 711 400) on the outer diameter of the check valve (machined section). Take care that Loctite is ONLY in this area.



APPLY LOCTITE ON THIS AREA ONLY

Install the check valve in the correct position as described on next photos into the crankcase lower side.



TYPICAL
A. PTO side 45° ± 5° from cylinder axis to the top
B. MAG side 20° ± 5° from cylinder axis to the bottom

Punch in the injection nozzle carefully with a plastic hammer.

Clean the crankcase from surplus of Loctite 648 with a rag.

Reinstall engine into vehicle. Refer to *ENGINE* section.

COOLING SYSTEM

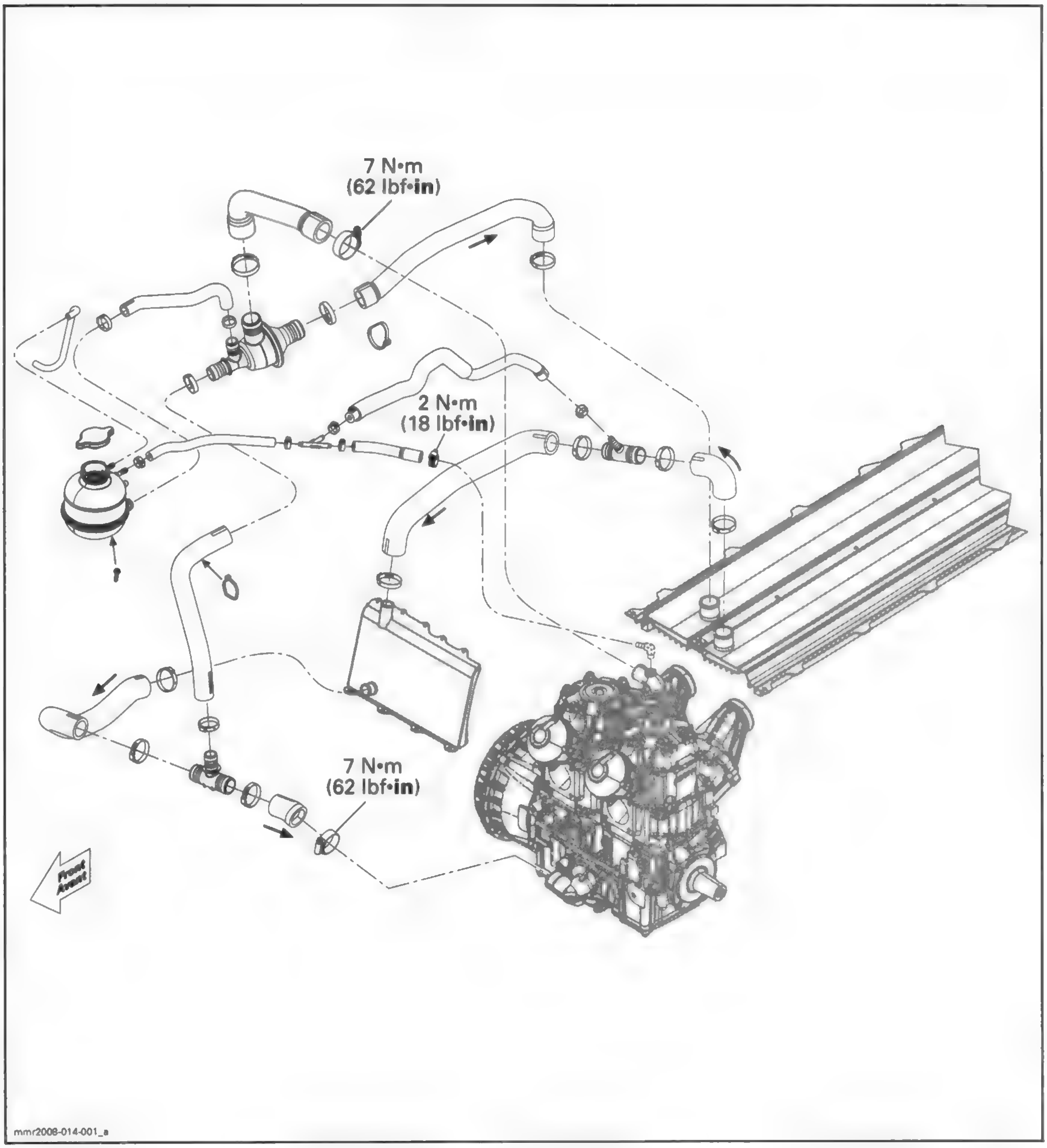
SERVICE TOOLS

Description	Part Number	Page
small hose pincher	295 000 076	79
vacuum/pressure pump	529 021 800	79
Supertanium™ bit	529 031 800	81
large hose pincher	529 032 500	79
suction pump	529 035 880	80
test cap	529 035 991	79

SERVICE PRODUCTS

Description	Part Number	Page
BRP premixed coolant	219 700 362	80

797 Engine Shown


7 N•m
(62 lbf•**in**)
2 N•m
(18 lbf•**in**)
7 N•m
(62 lbf•**in**)
Front
Avant
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GENERAL

NOTE: On applicable models, it is good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to the *COMMUNICATION TOOLS/B.U.D.S SOFTWARE* section.

During assembly/installation, use torque values and as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.) must be replaced with new ones.

INSPECTION

VEHICLE COOLING SYSTEM LEAK TEST

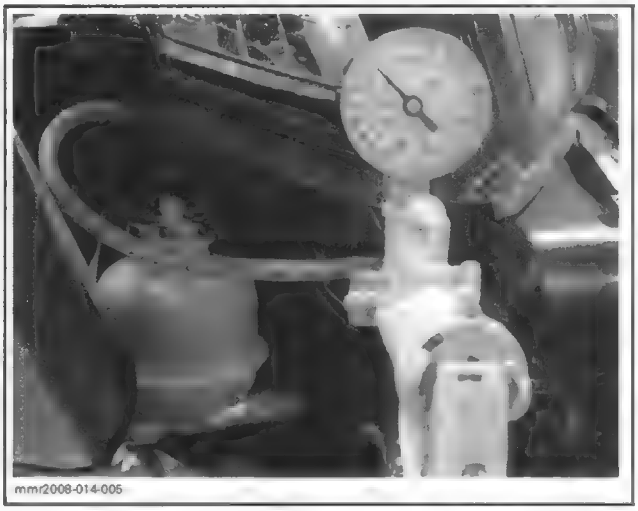
NOTE: This test confirms if there is no leak in the cooling system, including the engine.

⚠ WARNING

To prevent potential burns, do not remove the radiator cap if the engine is hot.

Remove hood.

Install the test cap (P/N 529 035 991) on coolant tank. Install a small hose pincher (P/N 295 000 076) on overflow hose. Using the vacuum/pressure pump (P/N 529 021 800) pressurize system through coolant reservoir to 100 kPa (15 PSI).



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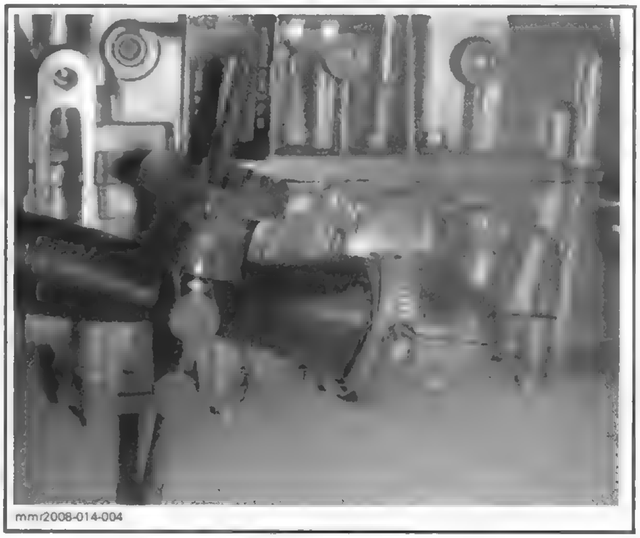
If pressure drops, check all hoses and engine for coolant leaks. Spray a soap/water solution and look for air bubbles.

ENGINE COOLING SYSTEM LEAK TEST

800R Engine

NOTE: An engine leak test should be performed prior to install engine in vehicle each time the engine is disassembled.

On the water pump side, install a suitable hose on the water pump housing and block it with a large hose pincher (P/N 529 032 500).



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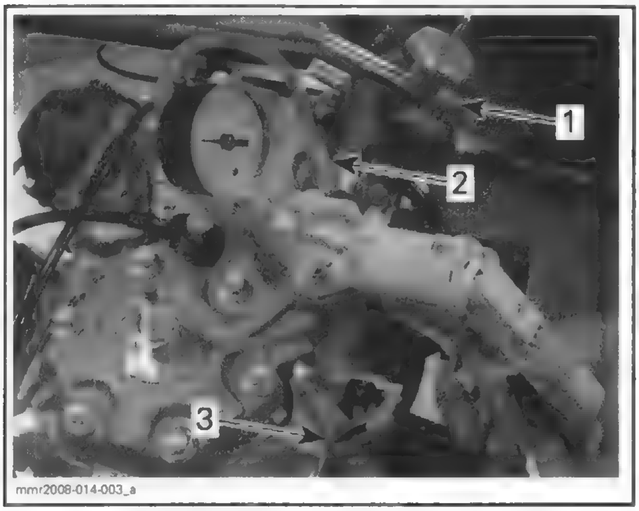
Install a hose on the the straight fitting on cylinder head and secure it with a clamp. Install a small hose pincher (P/N 295 000 076) to block the hose.

Install a hose on the water outlet housing and secure it with a clamp. Install a large hose pincher (P/N 529 032 500) to block this hose.

Install the vacuum/pressure pump (P/N 529 021 800) on the small elbow fitting.



1. Hose blocked on water outlet housing
2. Small elbow fitting
3. Hose blocked on staight fiting

Pressurize the engine to 100 kPa (15 PSI).

If pressure drops, spray a soap/water solution onto engine jointed surfaces and look for air bubbles.

MAINTENANCE

COOLANT REPLACEMENT

Recommended Coolant

Use BRP premixed coolant (P/N 219 700 362) or a blend of 50% antifreeze with 50% distilled water.

To prevent antifreeze deterioration, always use same brand. Never mix different brands unless cooling system is completely flushed and refilled.

CAUTION: To prevent rust formation or freezing condition, always replenish the system with the BRP premixed coolant or with 50% antifreeze and 50% water. Do not use tap water, straight antifreeze or straight water in the system. Tap water contains minerals and impurities which build up in the system. During cold weather, straight water causes the system to freeze while straight antifreeze thickens (like slush ice) and does not have the same efficiency. Always use ethylene glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

Cooling System Draining

⚠ WARNING

Never drain or refill the cooling system when engine is hot.

To drain the cooling system, siphon the coolant mixture from the coolant tank using the suction pump (P/N 529 035 880).

Place a large drain pan under the vehicle's bottom pan.

Unplug the coolant hose at water pump to drain coolant.

When the coolant level is low enough, lift the rear of vehicle to drain the radiators.

Cooling System Refill and Bleeding

Lift front of vehicle at least 60 cm (24 in) and support it safely.

With engine cold, refill coolant tank up to COLD LEVEL line. Start engine. Refill up to line while engine is idling until rear radiators are warm to the touch (about 4 to 5 minutes). Always monitor coolant level while filling tank to avoid emptying. Install pressure cap.

Lower vehicle back on the ground.

Lift rear of vehicle and support it safely.

Activate throttle lever 3 - 4 times to bring engine speed to 7000 RPM.

Apply the brake.

Lower vehicle back on ground and add coolant up to 15 mm (1/2 in) above the COLD LEVEL line.

When engine has completely cooled down, recheck coolant level in coolant tank and refill up to line if needed.

Check for coolant mixture freezing point. Specification is - 37°C (- 35°F). Adjust as necessary.

PROCEDURES

THERMOSTAT

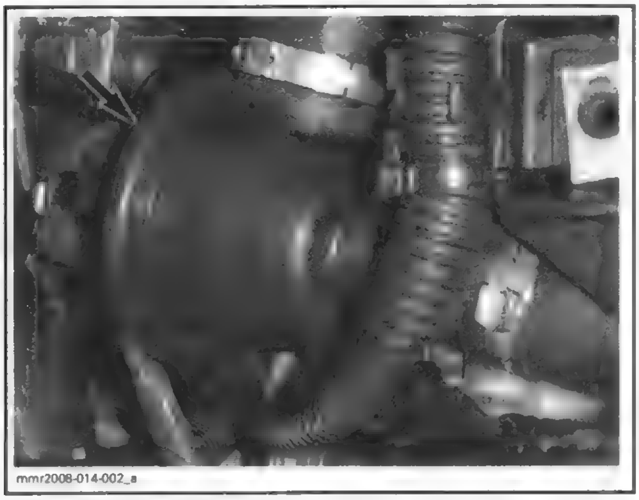
Thermostat Removal

For removal of thermostat, block all four thermostat hoses with hose pinchers or drain the cooling system (see above).

Remove muffler, refer to the *EXHAUST SYSTEM* section.

Remove acoustic panel.

Cut Oetiker clamps, unplug hoses and remove thermostat housing.



THERMOSTAT HOUSING

Thermostat Test

To check thermostat, put in water and heat water. Thermostat should start to open when water temperature reaches the following degree.

ENGINE	TEMPERATURE
All	37°C (99°F)

It will be almost fully open at 55°C (122°F).

Thermostat Installation

For installation, reverse the removal procedure.

Refill coolant system as described in this section.

RADIATOR CAP

Using a pressure cap tester, check the efficiency of radiator cap. If the efficiency is feeble, install a new 90 kPa (13 PSI) cap (do not exceed this pressure).

FRONT RADIATOR

Front Radiator Cleaning and Inspection

Remove all debris between radiator fins. A clean radiator is more efficient than a dirty one.

Check if the radiator fins are damaged. Replace the front radiator if necessary.

NOTE: A radiator with many broken fins does not work properly.

Front Radiator Removal

Drain cooling system.

Using a Supertanium™ bit (P/N 529 031 800), drill all four lower rivets retaining the front radiator under the frame or grind the rivets with a grinding disk.

500SS/800R

Remove carburetors, refer to the *TM CARBURETORS* section.

600 HO SDI

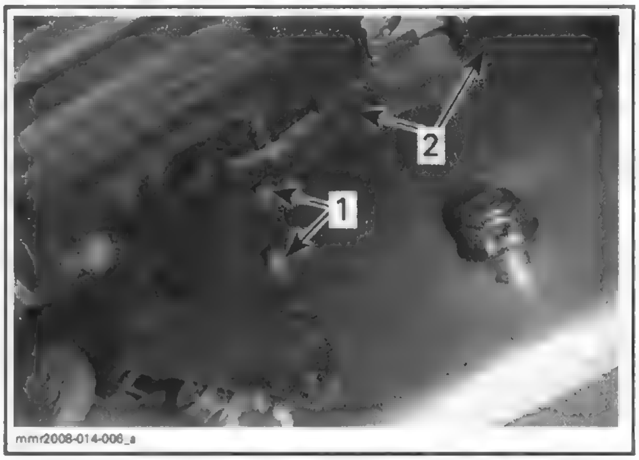
Remove throttle body, refer to the *SEMI-DIRECT INJECTION (SDI)* section.

All Models

Remove muffler, refer to the *EXHAUST SYSTEM* section.

Remove the two radiator protector front rivets and slightly bend it towards rear.

Remove the three upper rivets retaining the front radiator to the frame (a zip gun may be used).



RIVETS SHOWN WITHOUT COUNTERSHAFT FOR MORE CLARITY
1. *Upper radiator rivets*
2. *Front protector rivets*

Remove the rear engine mount nuts.

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ENGINE MOUNT SHOWN WITHOUT COUNTERSHAFT FOR MORE CLARITY

Remove the Oetiker clamps securing coolant hoses and remove radiator.

Front Radiator Installation

For installation, reverse the removal procedure.

Refill coolant system as described in this section.

REAR RADIATOR

Rear Radiator Cleaning and Inspection

Remove all debris between radiator fins. A clean radiator is more efficient than a dirty one.

Check if the radiator fins are damaged. Replace the rear radiator if necessary.

NOTE: A radiator with many broken fins does not work properly.

Rear Radiator Removal

Drain cooling system, see *COOLING SYSTEM DRAINING* in this section.

Remove rear suspension. Refer to the *REAR SUSPENSION* section.

Remove fuel tank. Refer to *FUEL TANK/FUEL PUMP*.

Remove snow guard.

Using a grinding disk, grind all rivets retaining rear radiator to frame.

NOTE: When pushing the cut rivets out, support the frame around the hole with a socket on the opposite side to avoid warpage.

Unplug coolant hoses from rear radiator then remove radiator from vehicle.

Rear Radiator Installation

The installation is the reverse of the removal procedure.

NOTE: If traction enhancing products (studs) are used on vehicle, install the appropriate radiator protector. Refer to *TRACK* to choose the proper protectors kit.

Refill coolant system as described in this section.

COOLANT TANK

Coolant Tank Removal

Remove hood.

Open RH side panel.

Siphon coolant tank and block the three lower hoses with pinchers.

Cut Oetiker clamps and remove all hoses from coolant tank.

Remove retaining screws to disengage coolant tank from frame.

Coolant Tank Inspection

Check if the tank is cracked or melted. Replace if necessary.

Coolant Tank Installation

For installation, reverse the removal procedure.

Refill coolant system as described in this section.

WATER PUMP

Refer to *BOTTOM END* section of the appropriate engine.

COOLANT TEMPERATURE SENSOR (CTS)

500SS/800R

NOTE: For the **600 HO SDI** models, Refer to the *SEMI-DIRECT INJECTION (600 HO SDI)* section.

General

When measuring the resistance with an ohmmeter, value is given for a temperature of 20°C (68°F). The value of a resistor varies with the temperature. The value for common resistor **increases** as the temperature increases. However, our temperature sensors are NTC types (Negative Temperature Coefficient) and work the opposite which means that the value **decreases** as the temperature increases. Use the table for sensor resistive values at given temperature.

The resistive value of a temperature sensor may test good at a certain temperature but it might be defective at other temperatures. If in doubt, try a new sensor.

Also remember this validates the operation of the sensor at room temperature. It does not validate the over temperature functionality.

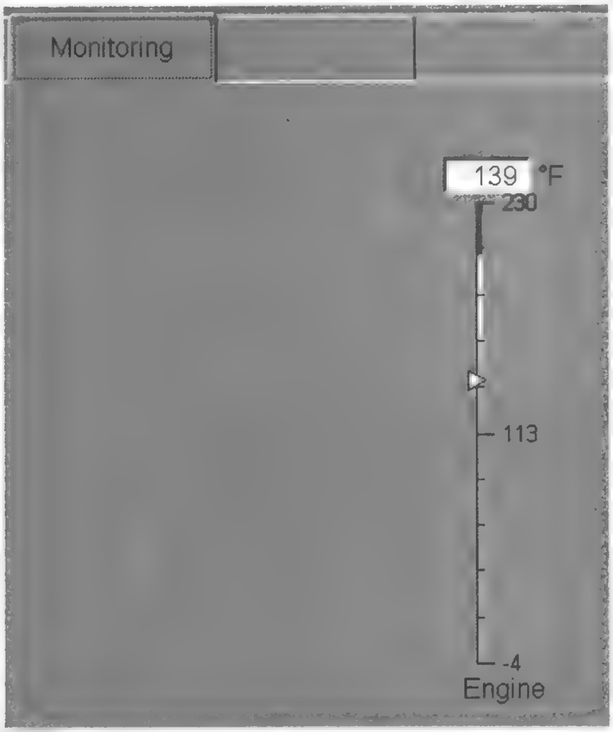
To test it, the sensor could be removed and heated with a heat gun (ensure not to heat excessively) while it is still connected to the harness to see if the ECM will detect the high temperature condition and generate a fault code.

A good test would be to put sensor in a container filled with ice and water and measure resistance. Then, boil water and read resistance again. According to the table above, a value would be approximately 5705 Ω with ice/water (0°C (32°F)) and 182.1 Ω with boiling water (100°C (212°F)).

CTS Dynamic Test

Use B.U.D.S. software.

Look engine temperature in **Monitoring** tab of B.U.D.S. It should show the coolant temperature. Otherwise, perform the following test.



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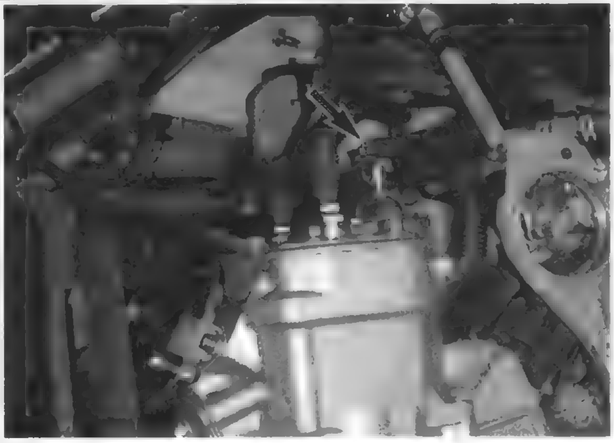
CTS Resistance Test

Remove pulley guard. Refer to *DRIVE SYSTEM/ BRAKE.*

Disconnect CTS sensor connector.



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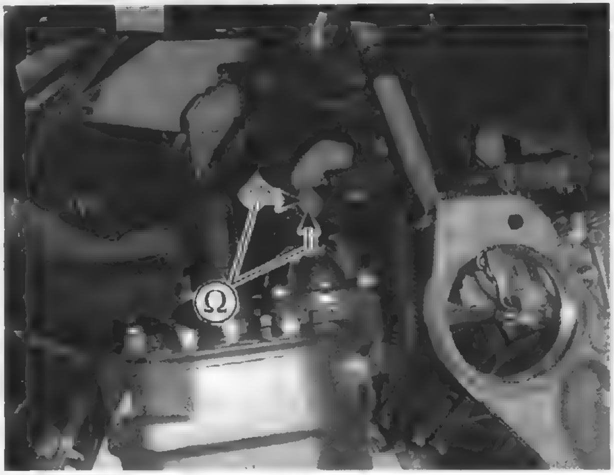
Use a multimeter and set it to Ω.

Measure resistance between sensor terminals.

CTS		RESISTANCE
Pin 1	Pin 2	Refer to *CTS SENSOR TEMPERATURE TABLE*



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CTS SENSOR TEMPERATURE TABLE		
UNIT		RESISTANCE (Ω)
°C	°F	CTS
- 40	- 40	43610
- 30	- 22	25090
- 20	- 4	14900
- 10	14	9102
0	32	5705
10	50	3680
20	68	2436
25	77	2000
30	86	1651
40	104	1144
50	122	807.6
60	140	580.3
70	158	424.4
80	176	315.5
90	194	238
100	212	182.1
110	230	141.1
120	248	110.6
130	266	87.8
140	284	70.4
150	302	57.1

CTS SENSOR TEMPERATURE TABLE		
UNIT		RESISTANCE (Ω)
°C	°F	CTS
160	320	46.7
170	338	38.5
180	356	32
190	374	26.8
200	392	22.7

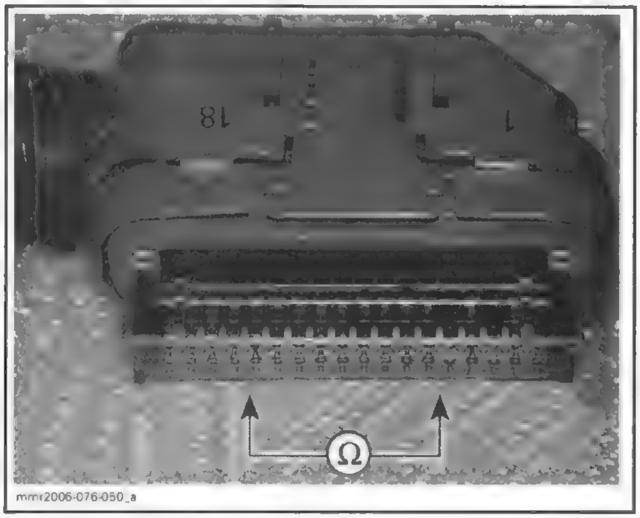
If resistance is out of specifications, replace sensor.

If resistance tests good, **reconnect** the CTS.

Disconnect the ECM connector.

Measure resistance as follows.

ECM CONNECTOR		RESISTANCE
Pin 1	Pin 21	Refer to *CTS SENSOR TEMPERATURE TABLE*



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If resistance value is correct, sensor and wiring/connectors are good.

If resistance value is incorrect, repair/replace wiring/connectors between ECM and CTS.

CTS Replacement

Remove pulley guard. Refer to *DRIVE SYSTEM/ BRAKE.*

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM.*

Remove driven pulley. Refer to *DRIVE SYSTEM/ BRAKE.*

Lift rear of vehicle to reduce coolant spillage.

Disconnect CTS connector.

Remove CTS.

Install the new CTS and torque to 12 N•m (106 lbf•**in**).

Reinstall removed parts.

Refill engine coolant. If an important quantity of coolant is spilled, bleed cooling system. Refer to *COOLING SYSTEM* section.

MAGNETO SYSTEM

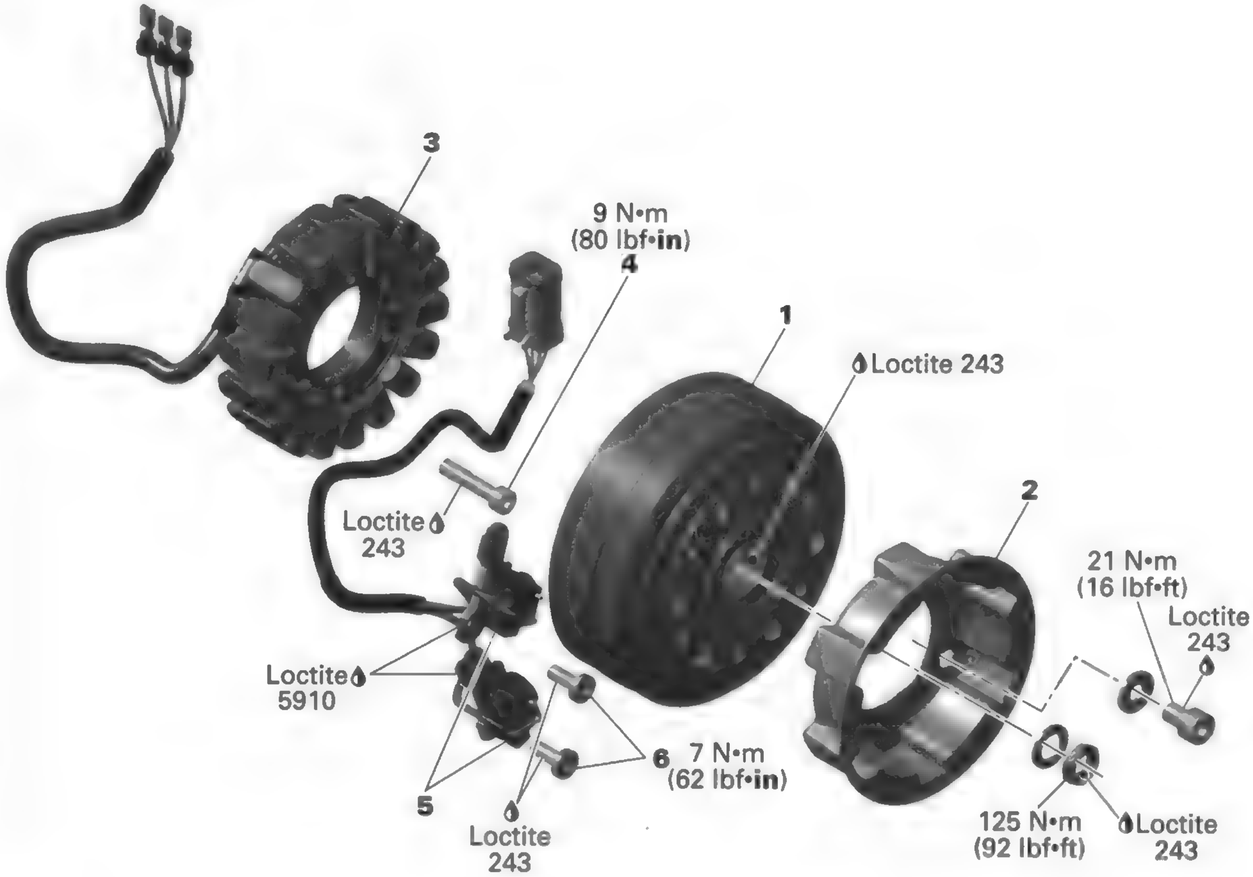
SERVICE TOOLS

Description	**Part Number**	**Page**
puller ring	420 876 081	90
crankshaft protector	420 876 557	90
magneto puller	529 035 547	90

SERVICE PRODUCTS

Description	**Part Number**	**Page**
Loctite 243 (blue)	293 800 060	91–92
Loctite 5910	293 800 081	93
Loctite 648	413 711 400	91

500SS


3
9 N•m
(80 lbf•**in**)
4
1
Loctite 243
2
Loctite
243
21 N•m
(16 lbf•ft)
Loctite
243
Loctite
5910
6
7 N•m
(62 lbf•**in**)
5
Loctite
243
125 N•m
(92 lbf•ft)
Loctite
243

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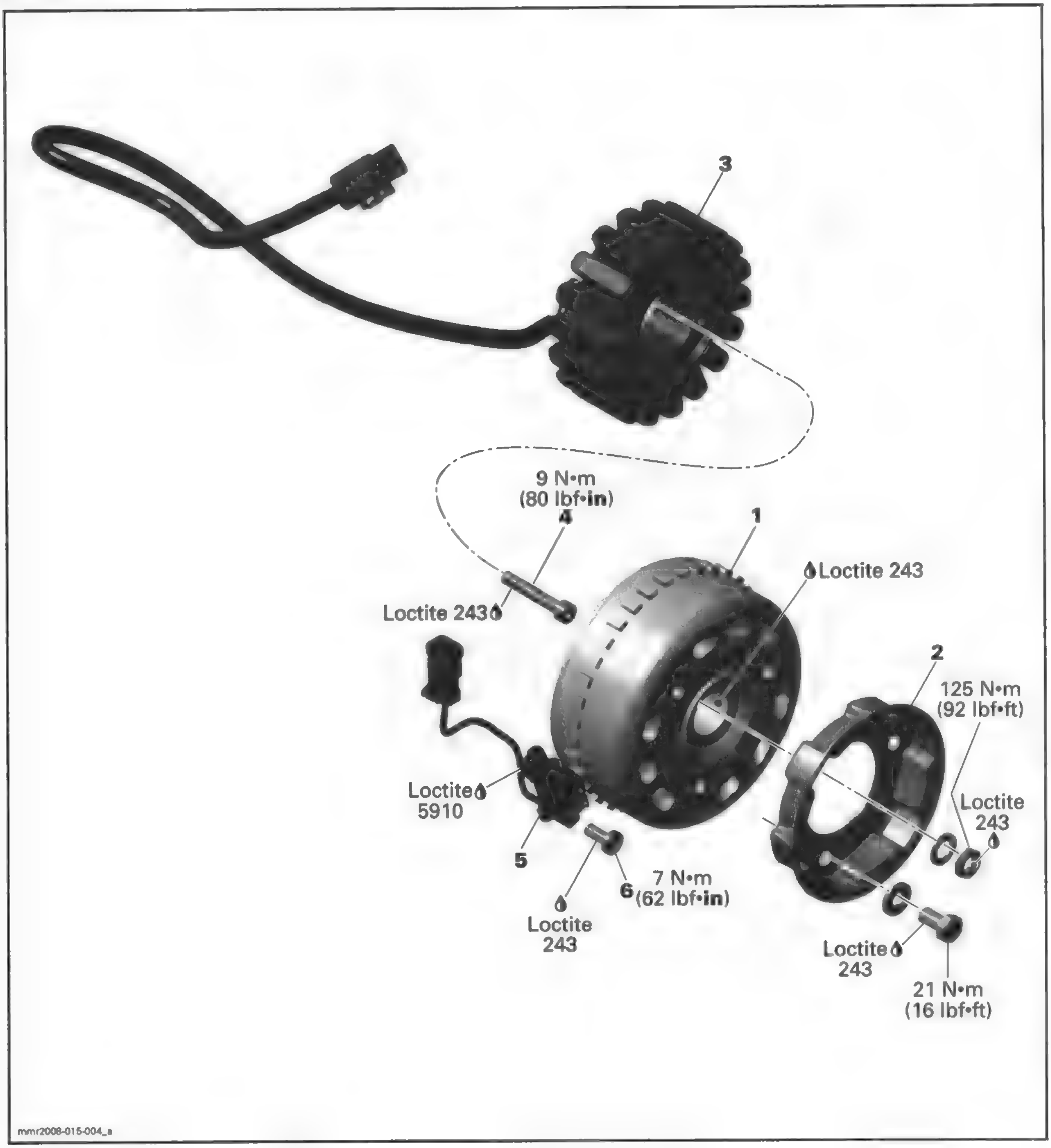
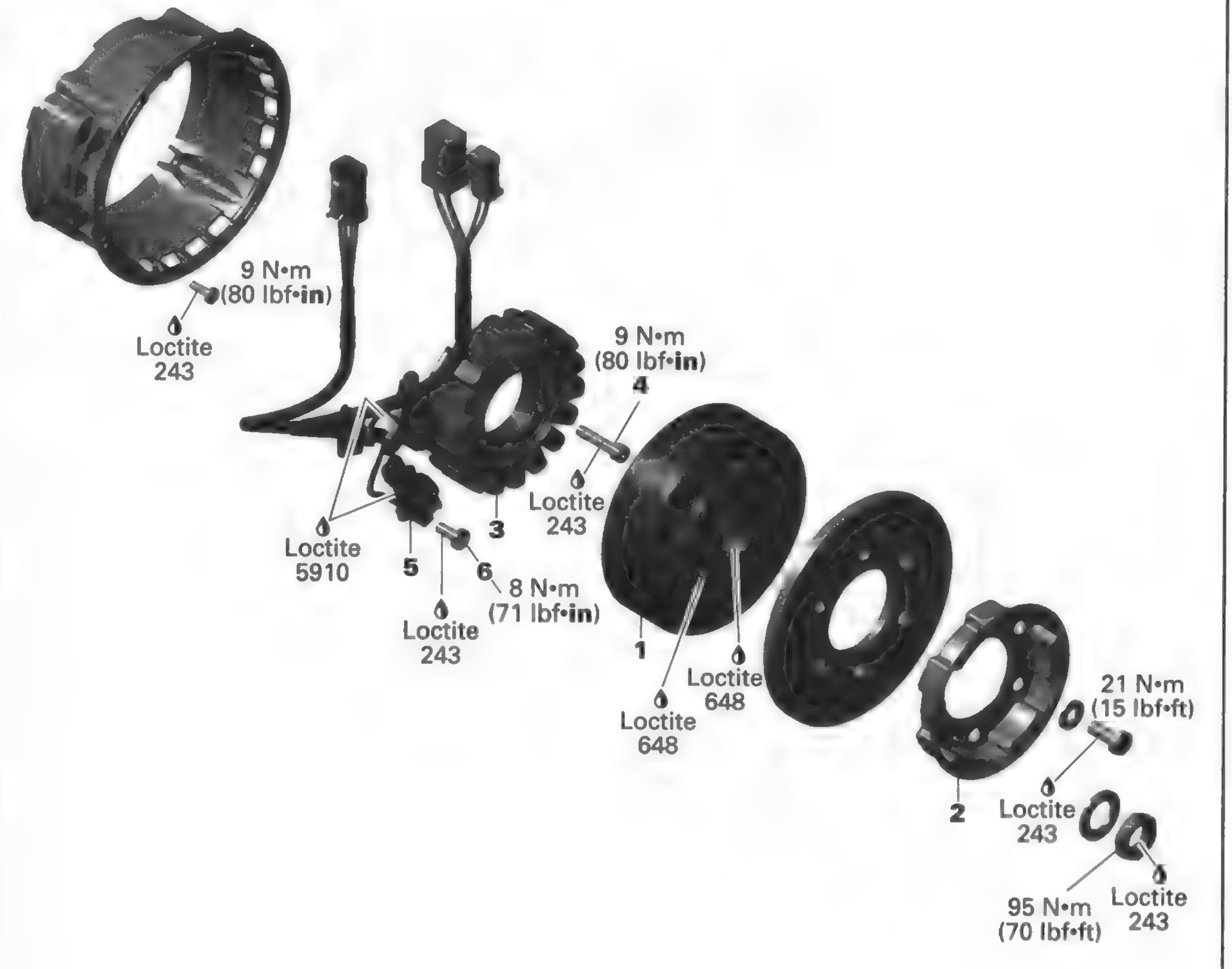
600 HO SDI


3
9 N•m
(80 lbf•**in**)
4
1
Loctite 243
Loctite 243
2
125 N•m
(92 lbf•ft)
Loctite
243
Loctite
5910
5
7 N•m
6 (62 lbf•**in**)
Loctite
243
Loctite
243
21 N•m
(16 lbf•ft)
mmr2008-015-004_a

800R


9 N•m
(80 lbf•in)
Loctite
243
9 N•m
(80 lbf•in)
4
Loctite
243
3
Loctite
5910
5
6
8 N•m
(71 lbf•in)
Loctite
243
1
Loctite
648
Loctite
648
21 N•m
(15 lbf•ft)
2
Loctite
243
95 N•m
(70 lbf•ft)
Loctite
243

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GENERAL

NOTE: The following procedures can be done without removing the engine.

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to the *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* sections at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be replaced with new ones.

PROCEDURES

MAGNETO FLYWHEEL

Magneto Flywheel Cleaning

Clean all metal components in a non-ferrous metal cleaner.

CAUTION: Clean magneto flywheel using only a clean cloth.

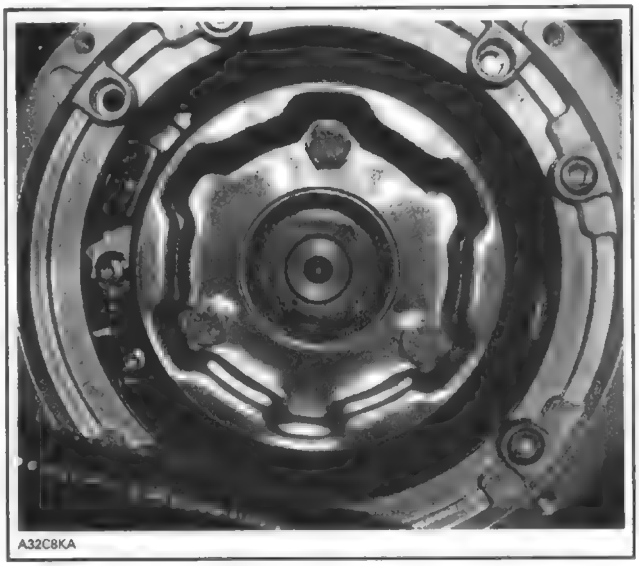
Magneto Flywheel Removal

Remove muffler, refer to the *EXHAUST SYSTEM* section.

Remove acoustic panel.

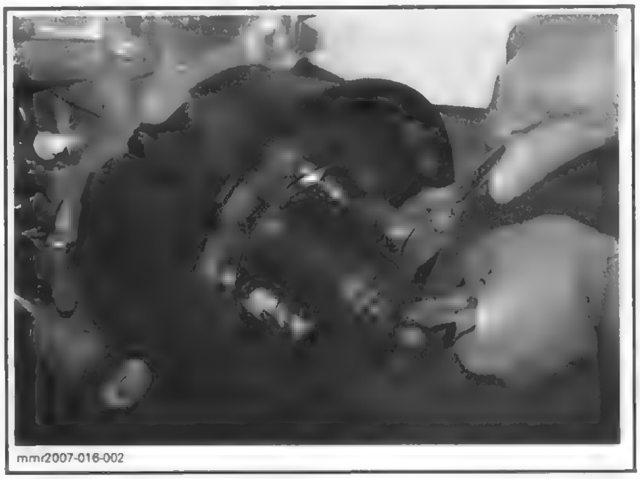
Remove rewind starter.

Remove starting pulley no. **2**.



TYPICAL

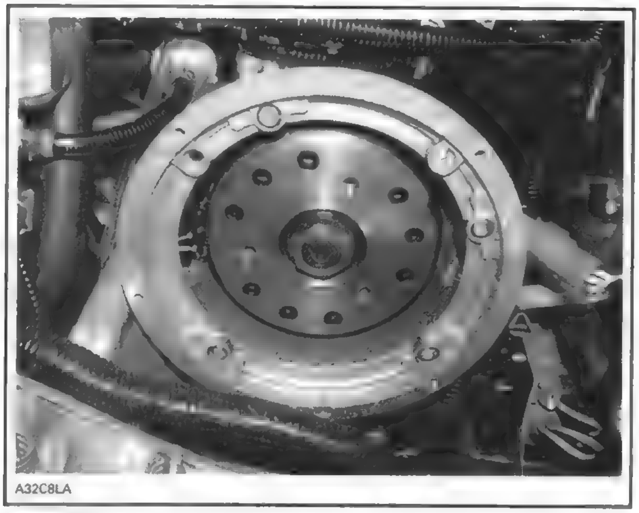
NOTE: To remove starting pulley bolts, hold magneto flywheel with a socket as shown.



TYPICAL

500SS and 600 HO SDI

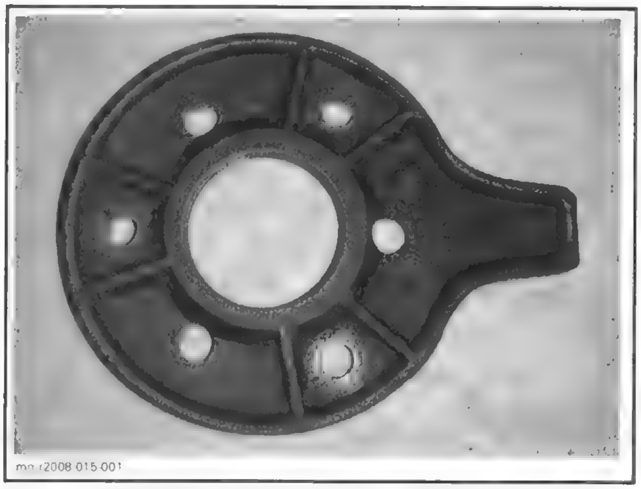
Remove the connecting flange retaining the rewind starter to the engine housing.



TYPICAL

All Engines

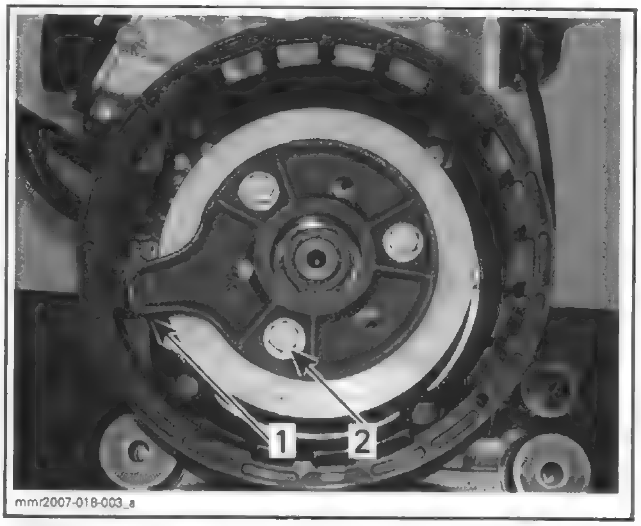
Install the puller ring (P/N 420 876 081) on magneto flywheel (or counterweight on 800R engine).



PULLER RING (P/N 420 876 081)

CAUTION: Use only the following screw length to bolt puller to magneto flywheel. Otherwise damage to stator behind magneto flywheel could occur.

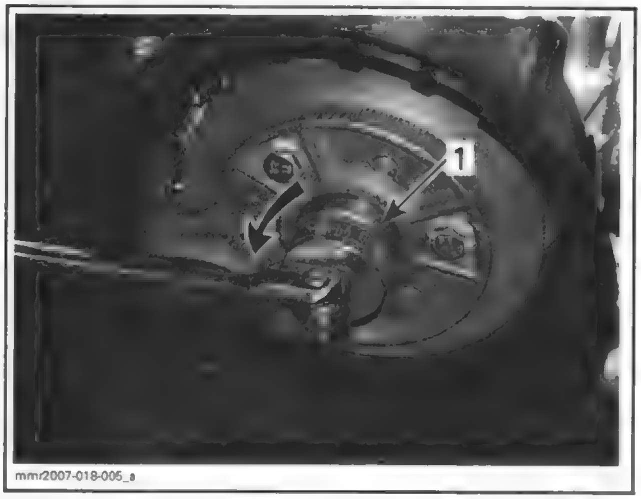
ENGINE	SCREW LENGTH
500SS	M8 x 20 mm
600 HO SDI	M8 x 25 mm
800R	M8 x 30 mm (COUNTERWEIGHT INSTALLED)



TYPICAL
1. Tab in magneto housing opening
2. M8 screws of appropriate length

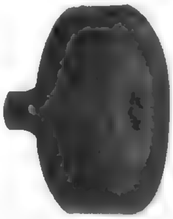
Remove magneto flywheel nut, using a 30 mm socket with the outside diameter machined to 40 mm (1.580 in) by 16 mm (5/8 in) long.

NOTE: To correctly remove a threadlocked fastener, first tap on the fastener to break threadlocker bond. This will avoid thread breakage.



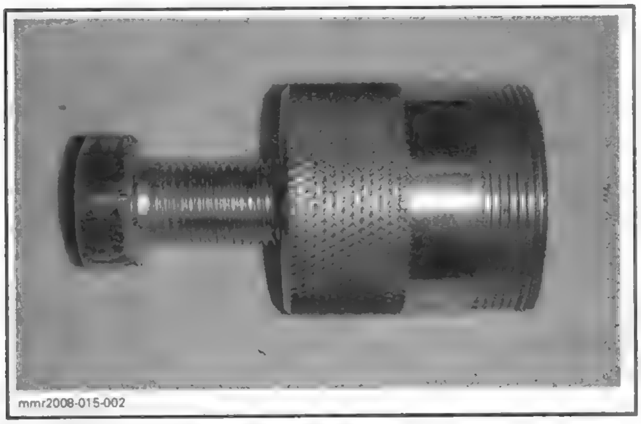
TYPICAL
1. Machined 30 mm socket

Install the crankshaft protector (P/N 420 876 557) on crankshaft end.



	420 876 557

Screw the magneto puller (P/N 529 035 547) into puller ring.



MAGNETO PULLER (P/N 529 035 547)

Tighten puller bolt and at the same time, tap on bolt head using a hammer to release magneto flywheel from its taper.

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Magneto Flywheel Installation

Clean crankshaft extension (taper) and apply specified product on taper surface (see table below), then position Woodruff key, magneto flywheel **no. 1** and lock washer on crankshaft.

ENGINE	PRODUCT
500SS/600 HO SDI	Loctite 243 (P/N 293 800 060)
800R	Loctite 648 (P/N 413 711 400)

Clean magneto flywheel nut threads and apply Loctite 243 (blue) (P/N 293 800 060) then tighten nut.

ENGINE	TORQUE
500SS/600 HO SDI	125 N•m (92 lbf•ft)
800R	95 N•m (70 lbf•ft)

CAUTION: Do not apply silicone dielectric grease or any other product on Deutsch waterproof housings otherwise housing seal will be damaged.

STATOR

Stator Inspection

Always check stator **no. 3** before changing it. Refer to the *CHARGING SYSTEM* section.

Stator Cleaning

Clean all metal components in a non-ferrous metal cleaner.

CAUTION: Clean stator using only a clean cloth.

Stator Removal

Remove magneto flywheel **no. 1**.

Remove all Allen socket screws **no. 4** retaining stator to magneto housing.

Remove grommet from crankcase where CPS/trigger coils **no. 5** and stator wires exit magneto housing.

Unplug the CPS/trigger coil connectors and pull the wires through the grommet location.

NOTE: On 600 HO SDI models, it is necessary to lift engine to reach CPS connector, refer to *SEMI-DIRECT INJECTION (SDI)* section for procedure.

NOTE: To pass the stator connector into the grommet location it is necessary to pass the CPS/trigger coil connector first.

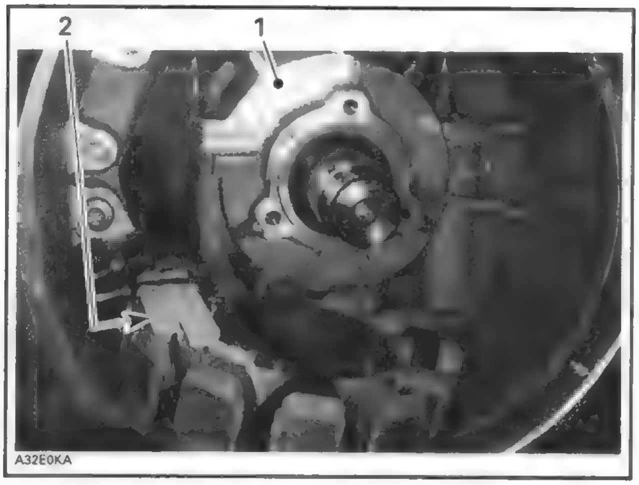
Unplug the stator connector and remove the stator **no. 3**.

Stator Installation

Insert the stator connector into crankcase grommet then the CPS/trigger coil connector(s).

Install the grommet on crankcase.

Position stator **no. 3** so that its wire protectors are over crankcase recess.



1. *Crankcase recess*
2. *Wire protectors*

NOTE: During installation, make sure the stator harness is located on the left side.

Apply Loctite 243 (blue) (P/N 293 800 060) on threads of stator screws then torque them to 9 N•m (80 lbf•**in**).

Reinstall all other removed parts.

CRANKSHAFT POSITION SENSOR (CPS)

600 HO SDI

CPS Test

Refer to *SEMI-DIRECT INJECTION (SDI)* section.

CPS Replacement

Refer to *TRIGGER COIL* for procedure.

TRIGGER COIL

Trigger Coil Inspection

500SS and 800R

For trigger coil inspection, refer to the *IGNITION SYSTEM* section.

Trigger Coil Removal

To replace the trigger coil(s) **no. 5**, remove or disconnect the following:

Remove magneto flywheel **no. 1**.

500SS and 800R

The trigger coil connector is located behind the oil filter (below oil reservoir).

600 HO SDI

Lift engine to have access to the connector. Refer to *SEMI-DIRECT INJECTION (SDI)* section for procedure.

All Models

Remove grommet from crankcase where trigger coil wire(s) exit(s) magneto housing.

Remove retaining screws **no. 6**.

Remove trigger coil(s) and carefully pull wires.

Trigger Coil Installation

For installation, reverse the removal procedure.

NOTE: It is important to remove the old silicon at trigger coil location then apply new silicon. Screw trigger coil then stick the trigger coil wires in the silicon.

MAGNETO HOUSING

800R Only

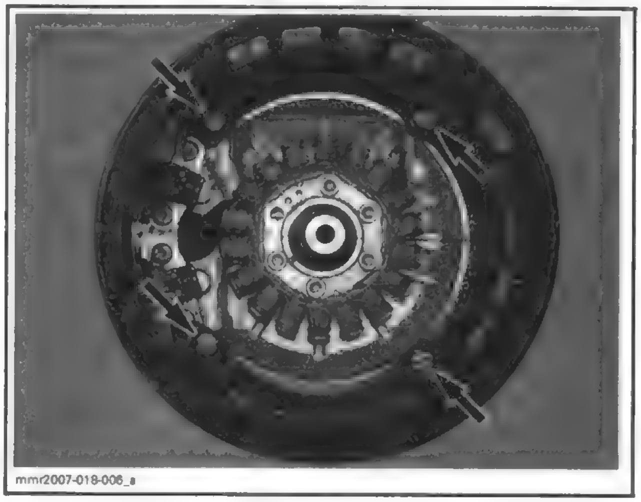
Magneto Housing Inspection

Inspect housing for cracks or other apparent damage. Replace as necessary.

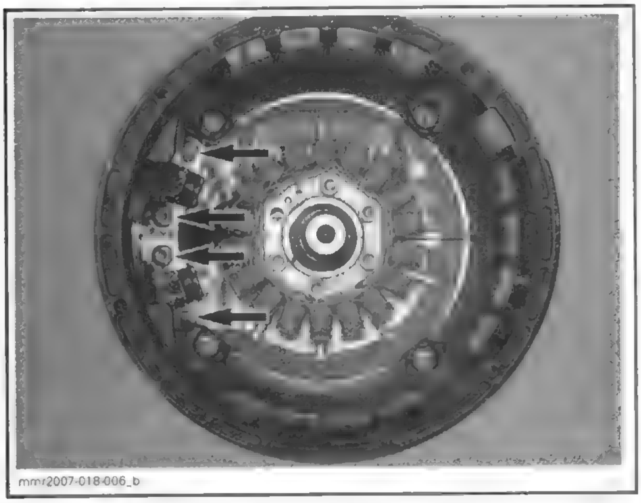
Magneto Housing Removal

Remove magneto flywheel.

Remove magneto housing retaining screws.



Remove trigger coil retaining screws.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Remove grommet from crankcase.

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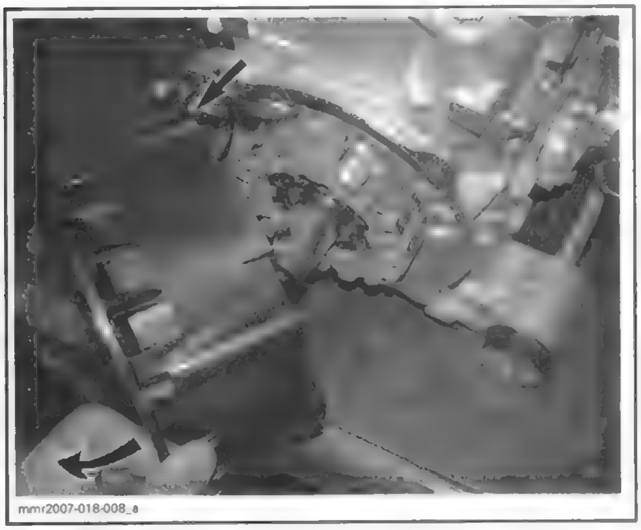
TYPICAL

Slightly pull magneto housing and cut silicone from trigger coils/crankcase.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TYPICAL

Pull out magneto housing with trigger coils.

Unglue trigger coils from housing.

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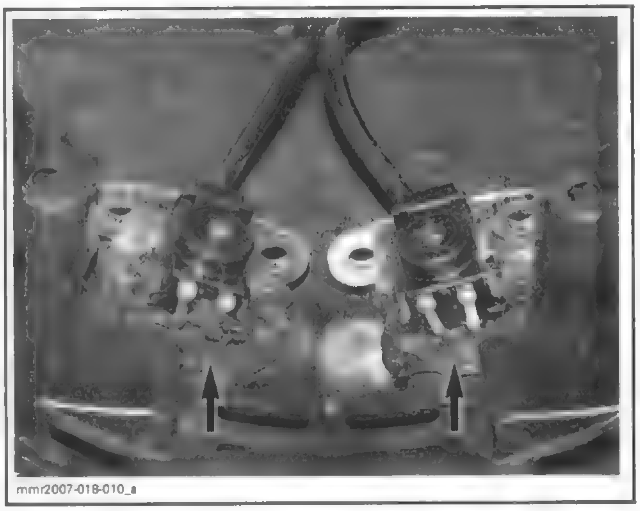
Magneto Housing Installation

For installation, reverse the removal procedure. Pay attention to the following.

Apply new silicone Loctite 5910 (P/N 293 800 081) and screw trigger coils. Then, stick the trigger coil wires in the silicone.


mmr2007-018-010_a

Reinstall magneto housing and properly torque screws.

TOP END (593)

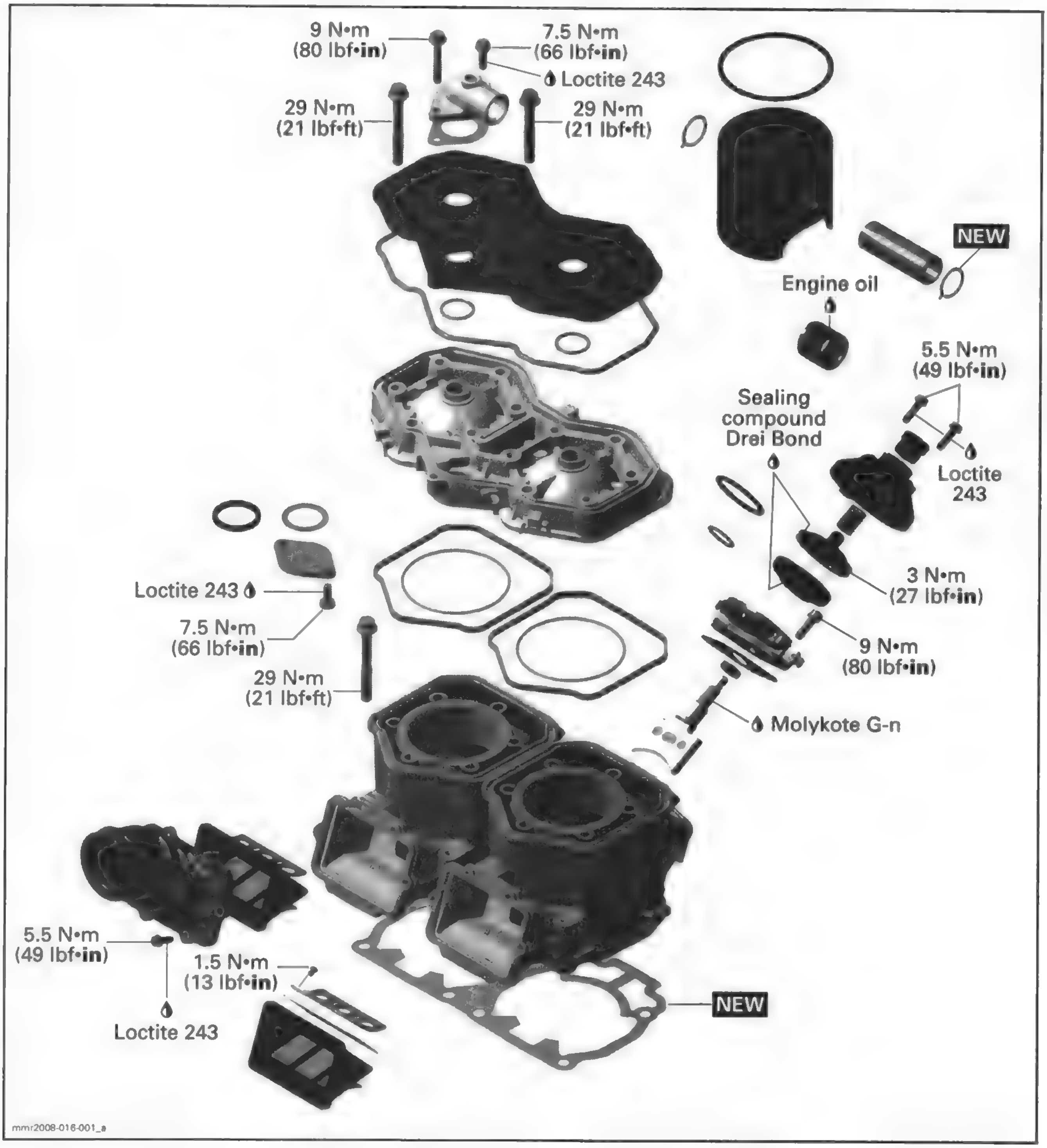
SERVICE TOOLS

Description	Part Number	Page
vacuum/pressure pump	529 021 800	100
rubber pad	529 023 400	109
Piston circlip installer	529 035 686	110
supply harness	529 035 869	100, 103

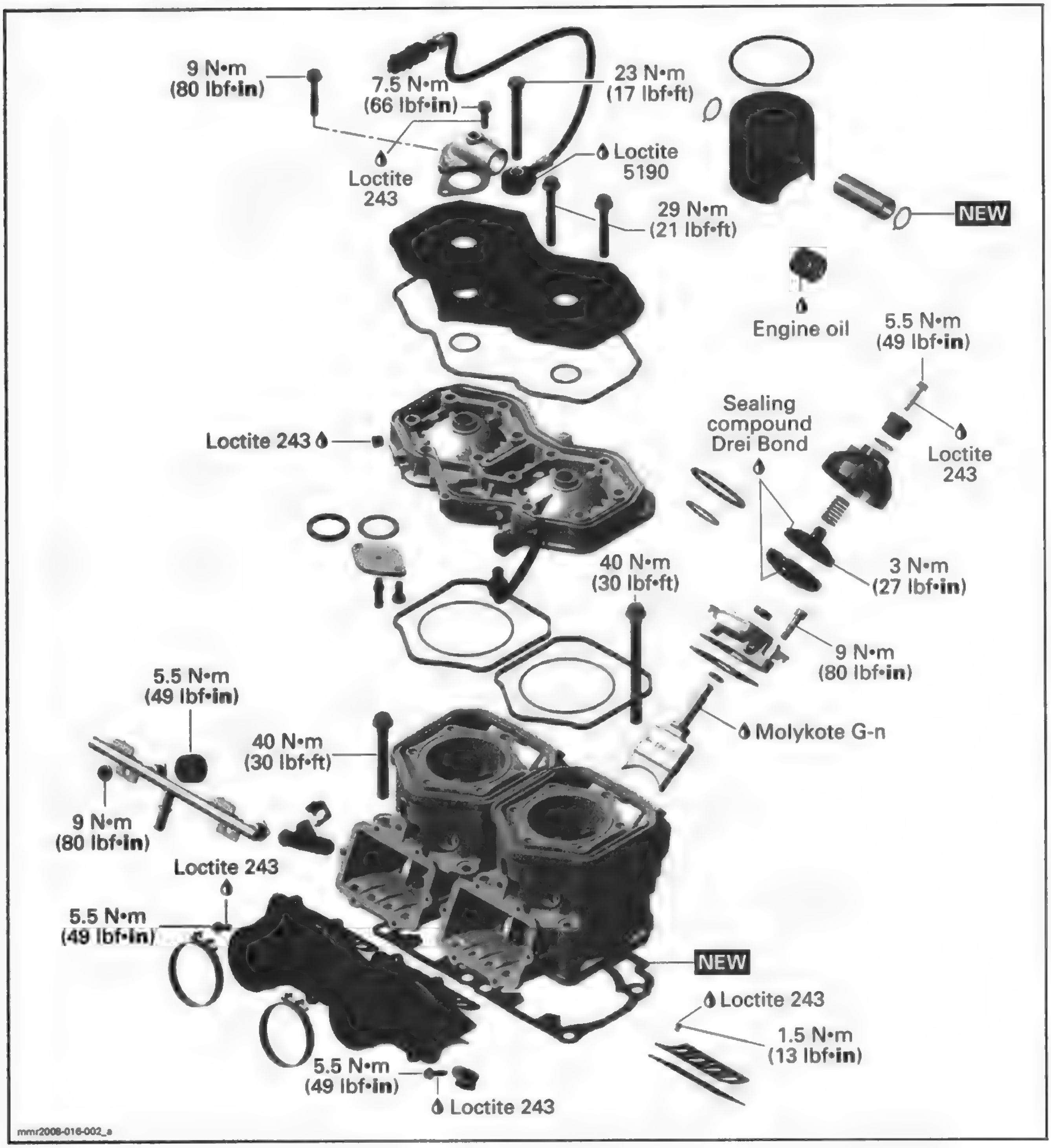
SERVICE PRODUCTS

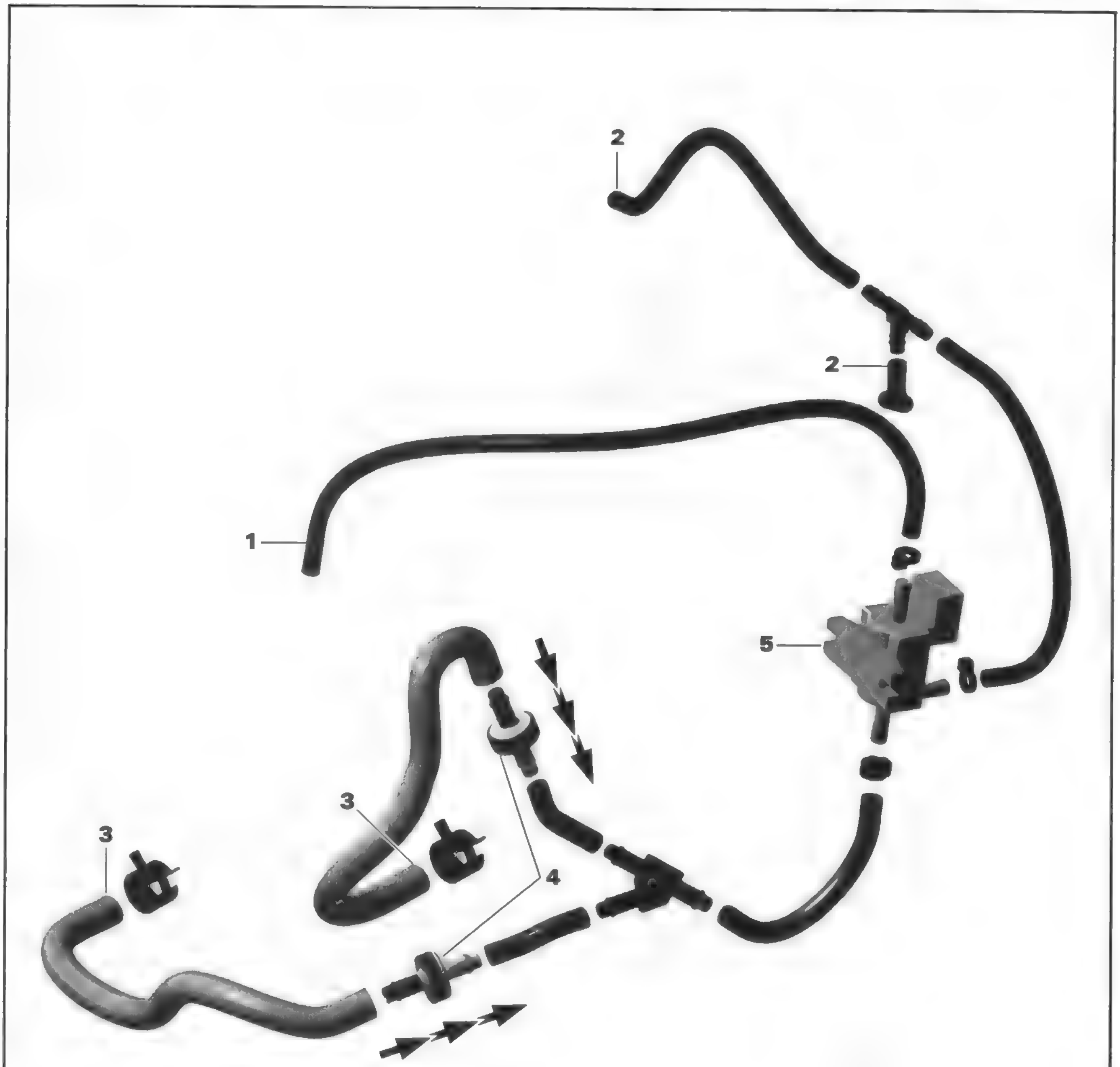
Description	Part Number	Page
Loctite 243 (blue)	293 800 060	107
Loctite Chisel	413 708 500	99
Drei Bond sealing compound	420 297 906	106

593 Engine


9 N•m
(80 lbf•**in**)
7.5 N•m
(66 lbf•**in**)
Loctite 243
29 N•m
(21 lbf•ft)
29 N•m
(21 lbf•ft)
NEW
Engine oil
5.5 N•m
(49 lbf•**in**)
Sealing
compound
Drei Bond
Loctite
243
3 N•m
(27 lbf•**in**)
9 N•m
(80 lbf•**in**)
Molykote G-n
Loctite 243
7.5 N•m
(66 lbf•**in**)
29 N•m
(21 lbf•ft)
5.5 N•m
(49 lbf•**in**)
1.5 N•m
(13 lbf•**in**)
NEW
Loctite 243
mmr2008-016-001_a

593 HO SDI Engine


9 N•m
(80 lbf•in)
7.5 N•m
(66 lbf•in)
Loctite
243
23 N•m
(17 lbf•ft)
Loctite
5190
29 N•m
(21 lbf•ft)
NEW
Engine oil
5.5 N•m
(49 lbf•in)
Loctite
243
Sealing
compound
Drei Bond
Loctite 243
3 N•m
(27 lbf•in)
40 N•m
(30 lbf•ft)
9 N•m
(80 lbf•in)
Molykote G-n
5.5 N•m
(49 lbf•in)
40 N•m
(30 lbf•ft)
9 N•m
(80 lbf•in)
Loctite 243
5.5 N•m
(49 lbf•in)
NEW
Loctite 243
1.5 N•m
(13 lbf•in)
5.5 N•m
(49 lbf•in)
Loctite 243
mmr2008-016-002_a


2
2
1
5
3
3
4
mmr2008-016-006_a

E-RAVE VALVES — HOSES, SOLENOID AND CHECK VALVE ARRANGEMENT (600 HO SDI ENGINE)
1. *To thottle body*
2. *To RAVE valves*
3. *To crankcase*
4. *Check valves*
5. *Solenoid*

GENERAL

Before completely disassembling the engine, check airtightness. Refer to *LEAK TEST*.

To measure internal parts, refer to *ENGINE MEASUREMENT* section.

During assembly/installation, use torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.) must be replaced with new ones.

Cleaning

Discard all gaskets and O-rings. Use Loctite Chisel (P/N 413 708 500) to clean mating surfaces.

Clean all metal components in a non-ferrous metal cleaner.

PROCEDURES

REED VALVE

Reed Valve Removal

Carburetors, refer to *FUEL SYSTEM* section.

Remove intake adapters, then reed valves.

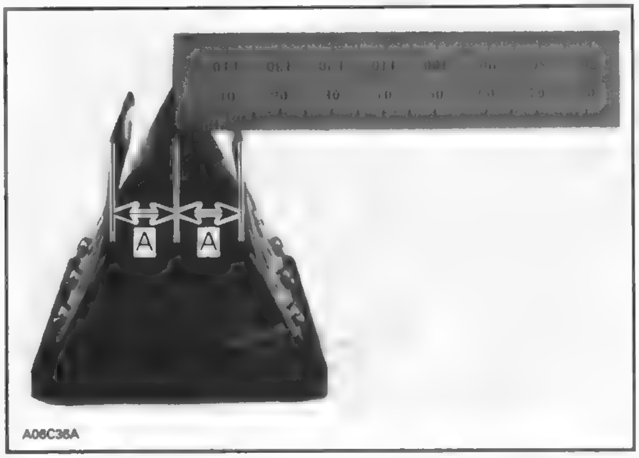
Reed Valve Inspection

Check reed valve for proper tightness. There must not be any play between blade and valve body when exerting a finger pressure on blade at blade stopper location.

In case of a play, turn blade upside down and recheck. If there is still a play, replace blade and/or valve body.

NOTE: Blades have a curved shape. Install with their curve facing reed block.

Check distance from blade stopper outer edge and distance from center of reed valve block.



TYPICAL
A. 593 engine: 14.75 - 0, + 0.75 mm (.580 - 0, + .030 in)
593 HO SDI engine: 17.5 - 0, + 0.75 mm (.689 - 0, + .030 in)

Bent blade stopper as required to obtain the proper distance.

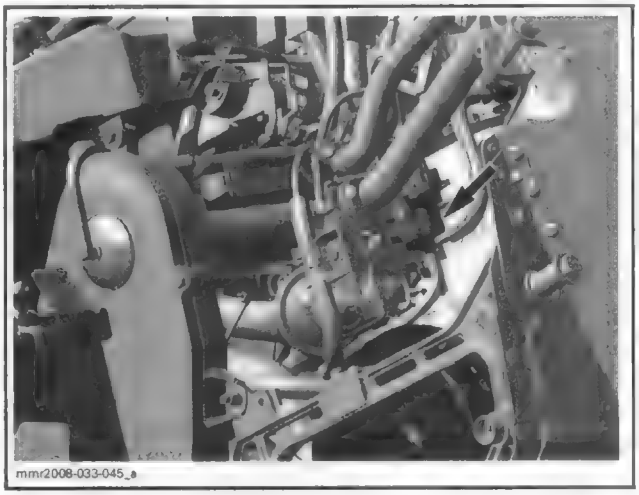
Reed Valve Installation

The installation is the reverse of the removal procedure.

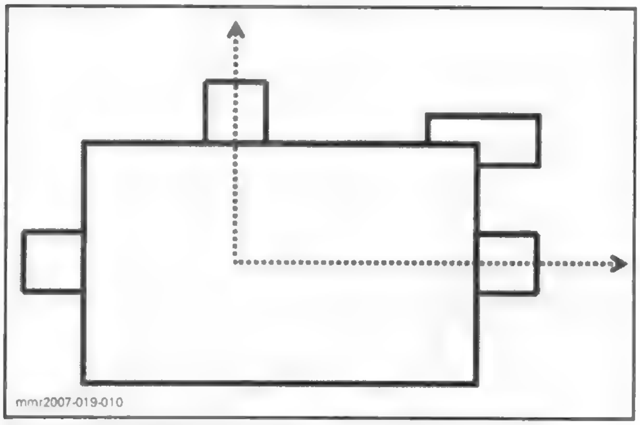
NOTE: Blade stoppers may slightly interfere with cylinder during installation. Adjusted distance will be reduced automatically upon installation.

E-RAVE SOLENOID

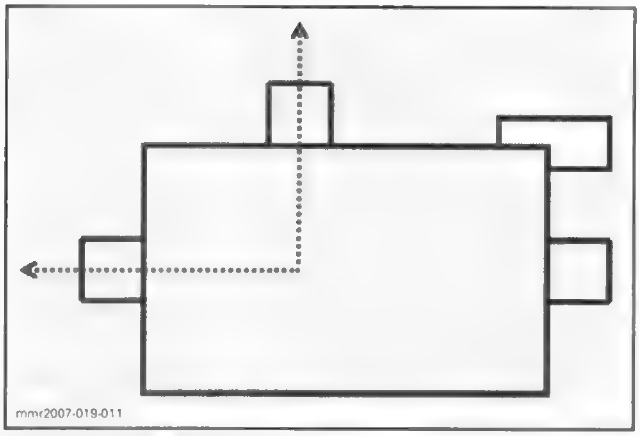
600 HO SDI



Operation Test

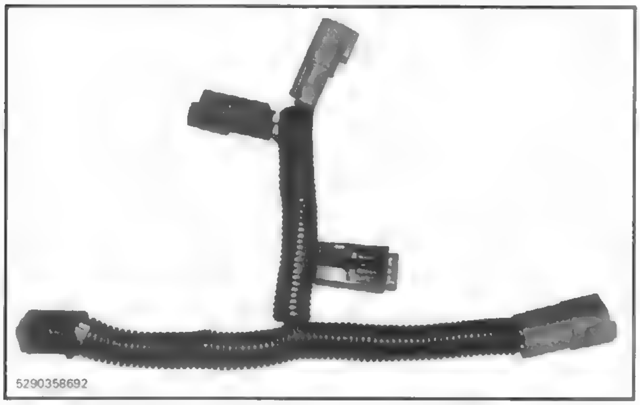


SOLENOID OPERATION (OFF)



SOLENOID OPERATION (ON)

Connect supply harness (P/N 529 035 869) to the 6-pin diagnostic connector of vehicle.



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Use B.U.D.S. software.

Energize the E-RAVE solenoid in **Activation** tab.

mmr2008-033-051

If solenoid does not click, carry out the electrical tests.

If solenoid clicks, this validates the electrical operation of the solenoid. Continue testing to validate the valve operation.

The following tests assume the following is in good condition. In doubt, check their operation.

- There is no leak in the RAVE valve system.
- The RAVE valves bellows are properly working.
- The RAVE valves are not stuck and are mechanically working.
- RAVE valve return springs are properly working.

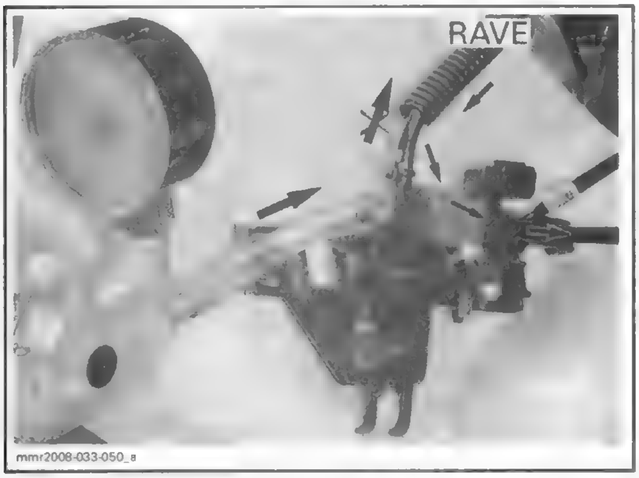
NOTE: At the end of all other tests, remember to ensure the check valves are properly working in the circuit.

Unplug supply hose from solenoid.

Use the vacuum/pressure pump (P/N 529 021 800).

Install test pump on supply nipple of solenoid.

Pressurize solenoid.



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TEST PRESSURE
69 - 103 kPa (10 - 15 PSI)

Wait some time to see if pressure drops:

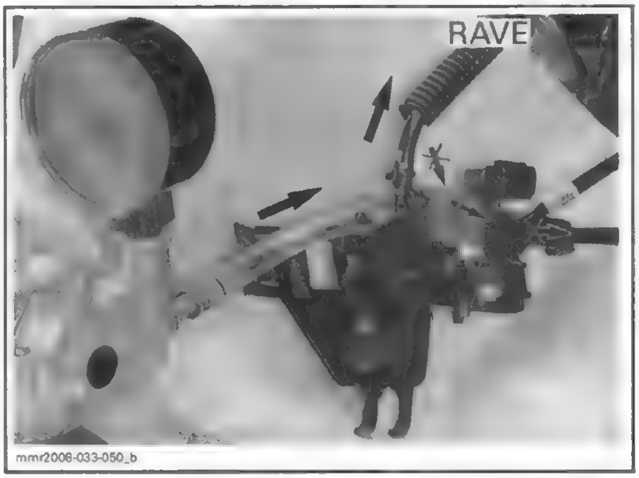
- If pressure does not build up or drops, replace solenoid.
- If pressure is maintained, continue testing.

Use B.U.D.S. software.

Energize the E-RAVE solenoid in **Activation** tab.

mmr2008 033-051

Pressure should flow to the RAVE valves. You should see the RAVE valves open.



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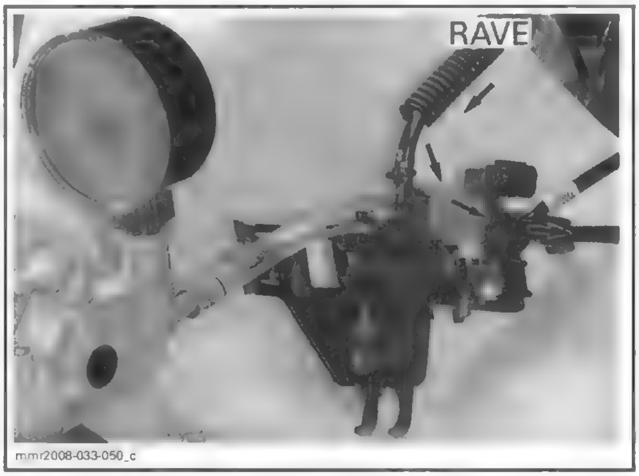
If solenoid did not click, carry out the electrical tests.

If solenoid turned on but RAVE valves do not open, replace solenoid.

When solenoid is turned off, RAVE valves should go down. Otherwise, replace solenoid.



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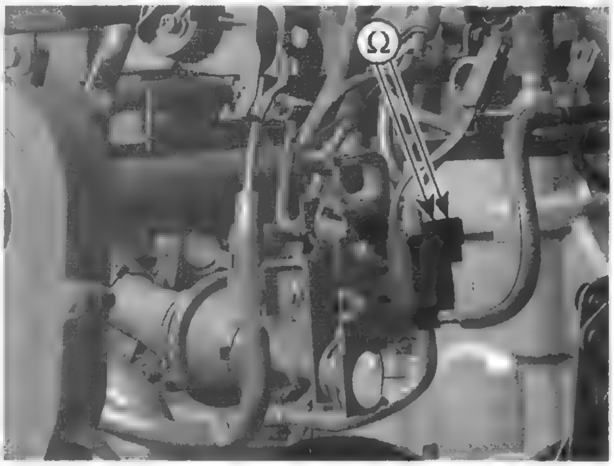
Resistance Test (RAVE Solenoid)

To gain access to connector, refer to *SOLENOID REPLACEMENT*.

Disconnect the solenoid connector.

Check resistive value of the solenoid as follows.

SOLENOID CONNECTOR		RESISTANCE @ 20°C (68°F)
Pin 1	Pin 2	Approx. 30 Ω



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If solenoid is out of specification, replace it.

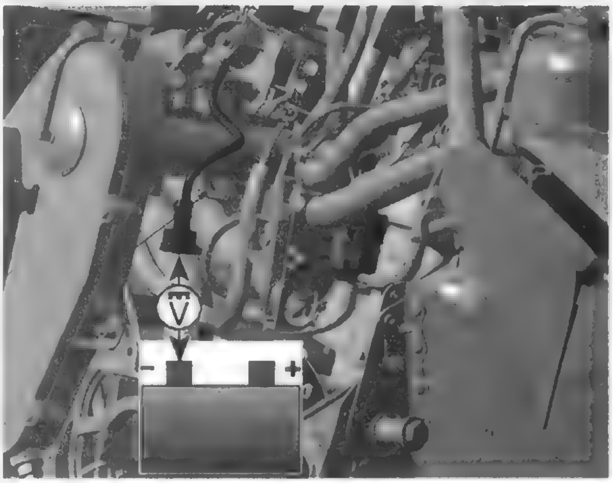
If solenoid is as per specification, proceed with the following tests.

Voltage Test (RAVE Solenoid)

Install the tether cord cap and push the START/RER button momentarily to activate ECM.

Measure voltage on solenoid harness connector as follows.

SOLENOID HARNESS CONNECTOR		MEASUREMENT
RED/GREY	Battery ground	Battery voltage



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If voltage is out of specification, check the following.

- Fuse F4
- Supply circuit from to solenoid. Refer to *WIRING DIAGRAM.*

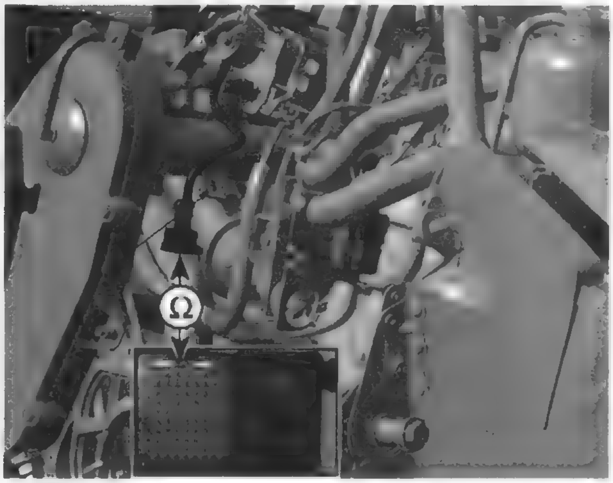
If voltage is as per specification, check control circuit.

Control Circuit Test (E-RAVE Solenoid)

Check wiring continuity between solenoid and ECM as follows.

Disconnect the B connector from ECM.

SOLENOID HARNESS CONNECTOR	ECM CONNECTOR	RESISTANCE
BROWN/WHITE	B-15	Close to 0 Ω (continuity)



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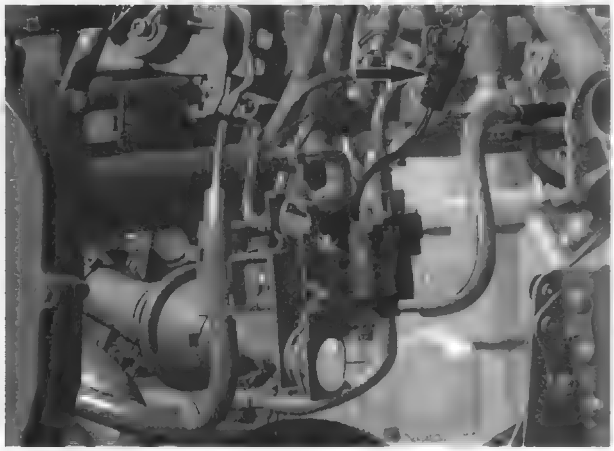
If measurement is out of specification, repair/replace wiring/connectors between solenoid and ECM.

If measurement is as per specification, try a new ECM.

Resistance Test (Solenoid Heater)

To gain access to connector, refer to *SOLENOID REPLACEMENT.*

Disconnect the solenoid heater connector.



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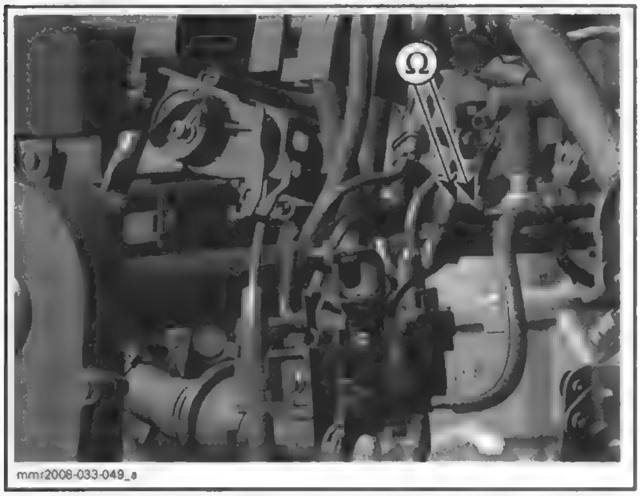
Check resistive value of the solenoid heater as follows.

NOTE: Resistance value greatly increases when heater is hot. A quick test can be done by plugging the supply harness and putting your finger against the heater. You should feel the warmth if heater works.

SOLENOID HEATER CONNECTOR		RESISTANCE @ 20°C (68°F)
Pin 1	Pin 2	Approx. 2.4 Ω



If solenoid heater is out of specification, replace it.

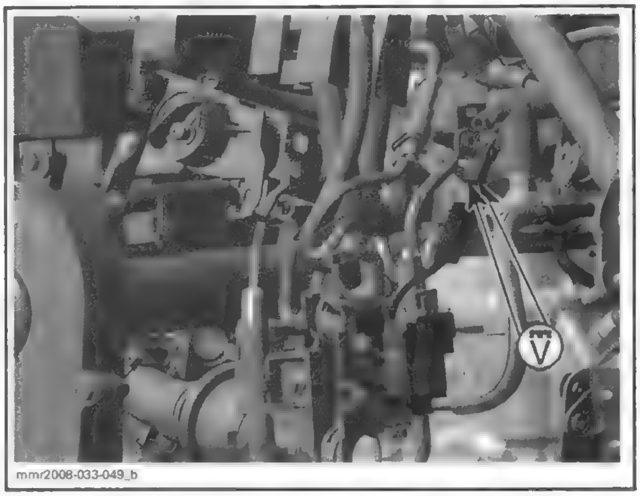
If solenoid heater is as per specification, proceed with the following tests.

Voltage Test (Solenoid Heater)

Connect supply harness (P/N 529 035 869) to the 6-pin diagnostic connector of vehicle.

Measure voltage on harness connector of solenoid heater as follows.

HARNESS CONNECTOR OF SOLENOID HEATER		MEASUREMENT
RED/YELLOW	BLACK	Battery voltage



If voltage is as per specification, solenoid heater circuit is good.

If voltage is out of specification, recheck as follows.

HARNESS CONNECTOR OF SOLENOID HEATER		MEASUREMENT
RED/YELLOW	Battery ground	Battery voltage

If voltage is now as per specification, check control circuit.

If voltage is out of specification, check the following.

- Fuse F6
- Supply circuit from relay 3 to solenoid heater. Refer to *WIRING DIAGRAM.*

Control Circuit Test (Solenoid Heater)

Check wiring continuity between solenoid heater and battery groun as follows.

HARNESS CONNECTOR OF SOLENOID HEATER	RESISTANCE
BLACK with battery ground	Close to 0 Ω (continuity)

If measurement is out of specification, check battery and engine grounds. If grounds are good, repair/replace wiring/connectors between solenoid heater and battery ground.

Solenoid Replacement

Remove muffler. Refer to *EXHAUST SYSTEM.*

Remove acoustic panel.

Unplug the solenoid connector and all hoses.

NOTE: Mark hose locations for installation.

Remove solenoid screw then the solenoid.

For installation, reverse the removal procedure.

RAVE AND E-RAVE VALVES

Rave Valves Basic Operation

NOTE: RAVE stands for Rotax Adjustable Variable Exhaust.

The RAVE valves change the height of the exhaust port to enhance the engine powerband and torque according to the engine RPM and throttle position (e-RAVE on the SDI engine).

593 Engine

Exhaust pressure is used to inflate the bellows and open the RAVE valves at the proper engine RPM.

593 HO SDI Engine

The electronically controlled RAVE (e-RAVE) offers two performance enhancements to conventional RAVE system.

- The opening and closing of the valve is activated electronically. The ECM monitors altitude, engine temperature, throttle position and RPM, and operates the solenoid in optimal conditions.
- The valve is opened by crankcase pressure. The greater and more constant pressure from the crankcase opens the valve more crisply. Both RAVE valves operate at the same time.

To close the RAVE valves, the ECM deactivates the solenoid. A return spring assisted by the crankcase vacuum close the valve.

NOTE: An electric heating element has been added to the RAVE solenoid to ensure proper function in very cold weather.

Rave Valves Removal and Disassembly

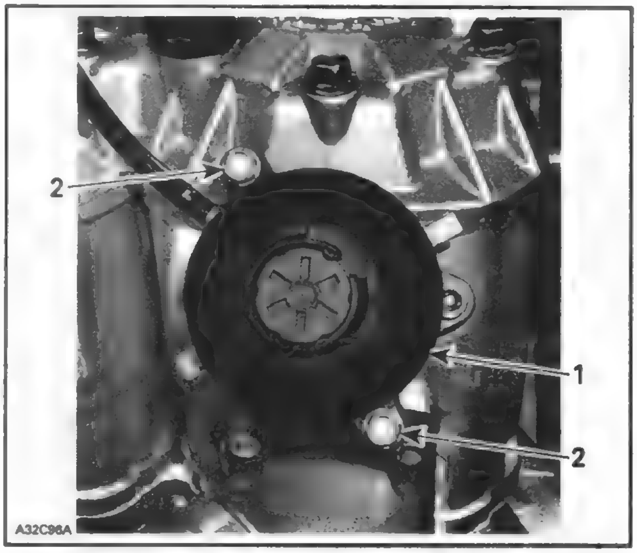
Remove LH side cover.

Remove tool kit support located on drive pulley guard.

Remove RAVE valve cover by removing screws.

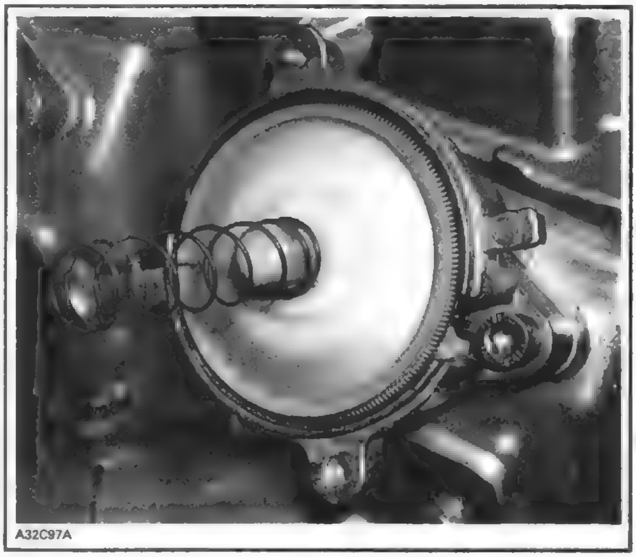
⚠ WARNING

Firmly hold cover to valve base. The compression spring inside the valve is applying pressure against the cover.



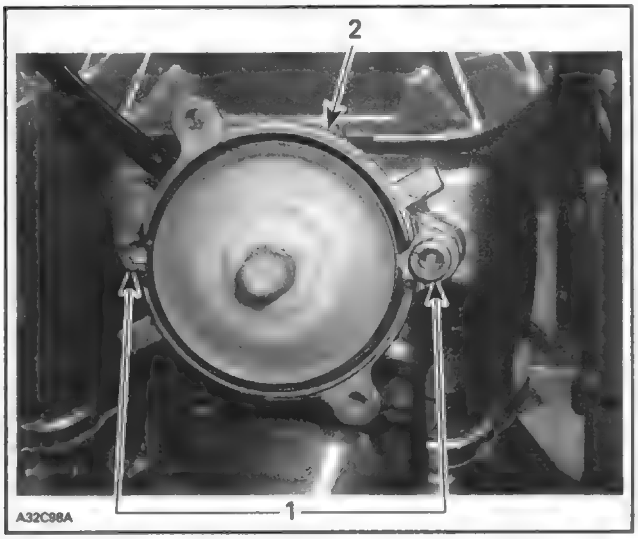
TYPICAL
1. Cover
2. Retaining screws

Remove the compression spring.



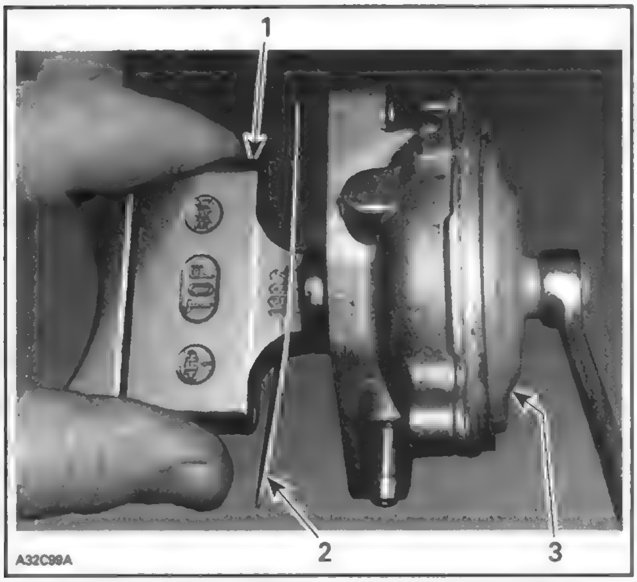
TYPICAL

Unscrew the Allen socket screw then remove the RAVE valve base.



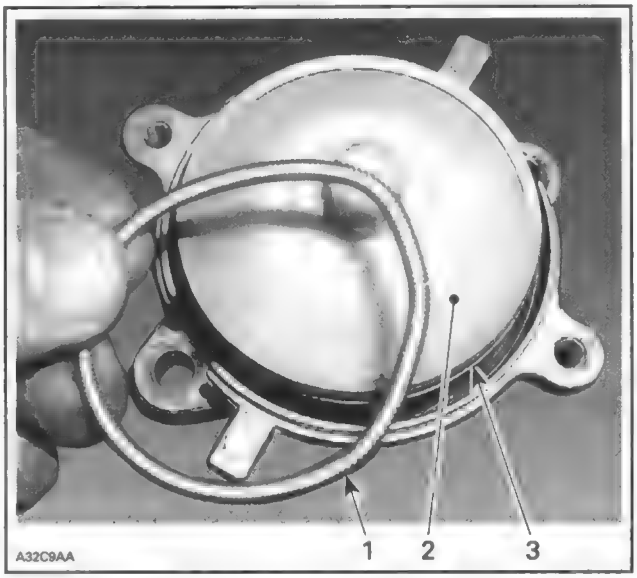
TYPICAL
1. *Allen socket screws*
2. *RAVE valve base*

Unscrew and remove the guillotine from the valve piston than remove the gasket.



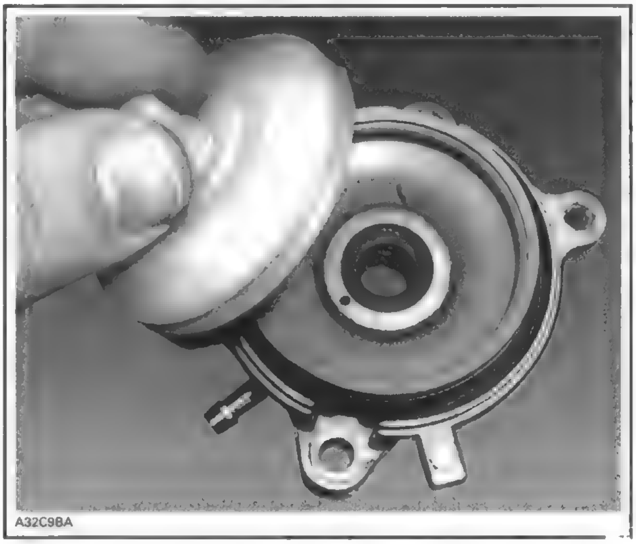
TYPICAL
1. *Guillotine*
2. *Gasket*
3. *Valve piston*

Remove spring retaining bellows to valve piston.



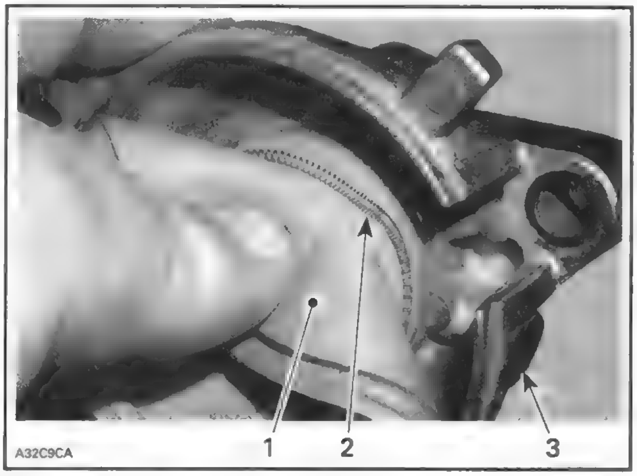
TYPICAL
1. *Spring*
2. *Valve piston*
3. *Bellows*

Remove valve piston.



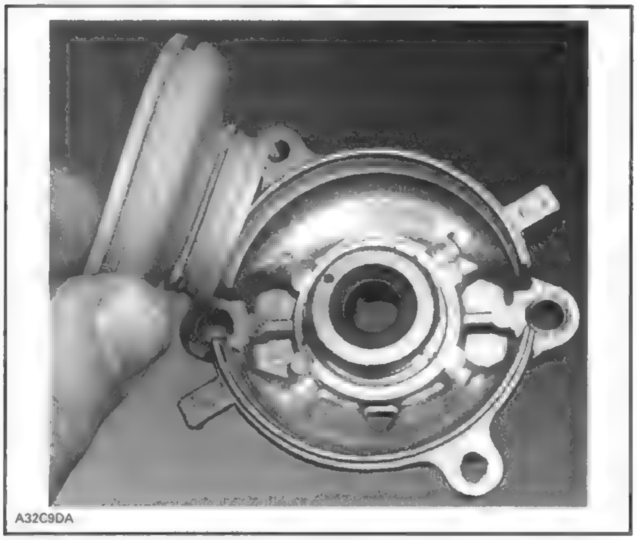
TYPICAL

Remove the small spring retaining bellows to valve base.



TYPICAL
1. *Bellows*
2. *Small spring*
3. *Valve base*

Remove bellows from valve base.



TYPICAL

Rave Valves Inspection

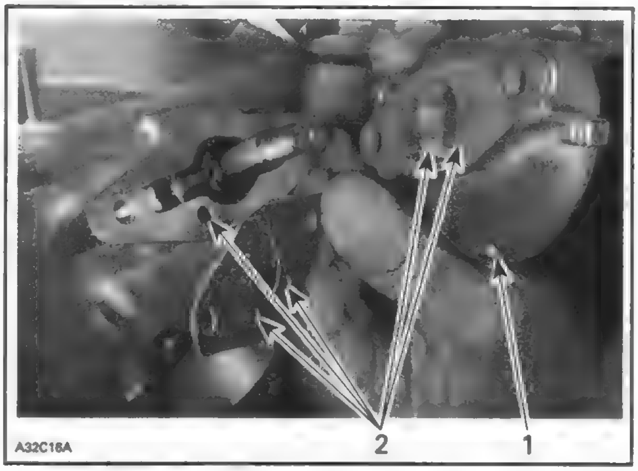
NOTE: If there is oil in the valve base, replace seal.

There are no wear parts anywhere in the system and there are no adjustments to be periodically checked. The only possible maintenance required would be cleaning of carbon deposits from the guillotine slide. Cleaning intervals would depend upon the user's riding style and the quality of the oil used.

BRP suggests annual cleaning of the valve. If a customer uses lower quality oil, than recommended, more frequent cleaning may be required.

No special solvents or cleaners are required when cleaning the valve.

Check valve rod housing and cylinder for clogged passages (**all models except SDI**).



1. *Draining hole*
2. *Passages*

NOTE: Oil dripping from draining hole indicates a loosen spring or damaged bellows.

Check for cracked, dried or perforated bellows.

593 Engine

In its stock configuration, the RAVE valve guillotine has a minimum of 0.5 mm (.020 in) clearance to the cylinder bore measured at the center line of the cylinder. This is the minimum production clearance.

593 HO SDI Engine

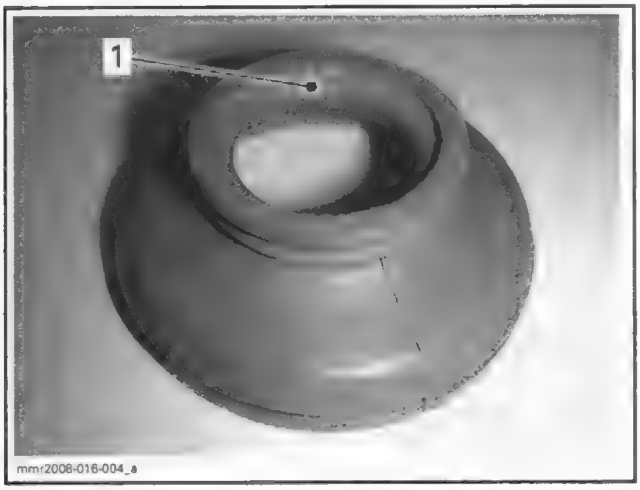
Check if solenoid heating element is still functional once a year, the element should be warm after one minute of riding. At the same time, check if crankcase check valve is still functional.

NOTE: Make sure hoses are not kinked or damaged.

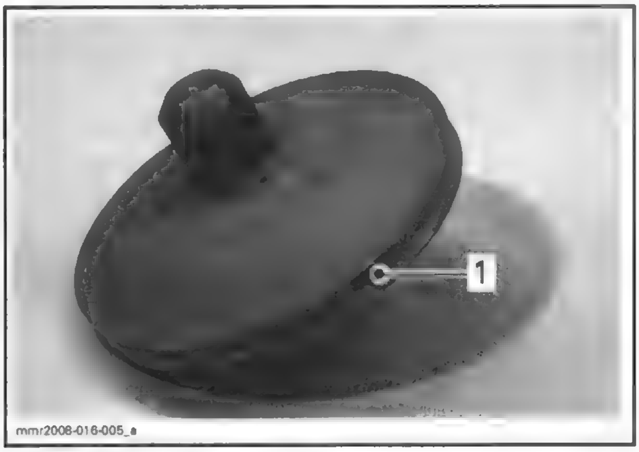
Rave Valves Assembly and Installation

Assembly and intallation are the reverse of the removal, however, pay attention to the following.

Apply Drei Bond sealing compound (P/N 420 297 906) on the bellow lower rib and in the valve piston groove.

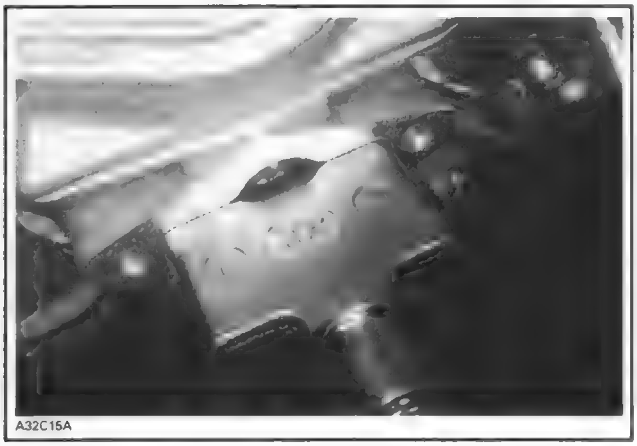


1. Apply Drei Bond here



1. Apply Drei Bond here

Install RAVE valve with its mention TOP as illustrated in the following photo.



CYLINDER HEAD COVER

Cylinder Head Cover Removal

Remove LH side cover.

Remove tool kit support and drive belt cover.

Drain coolant, refer to *COOLING SYSTEM*.

Remove spark plugs.

On **SDI models**, remove the knock sensor.

Unplug coolant hoses from upper coolant socket.

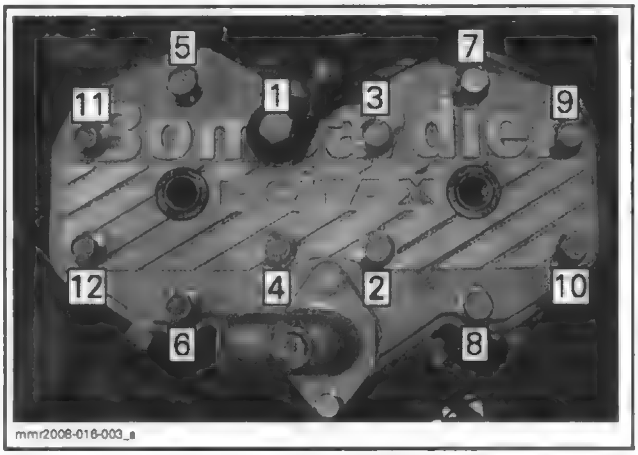
Unscrew all cylinder head cover screws and the rear upper coolant socket screw.

Cylinder Head Cover Inspection

Check cylinder head cover for cracks, warp or other damages. Replace if necessary.

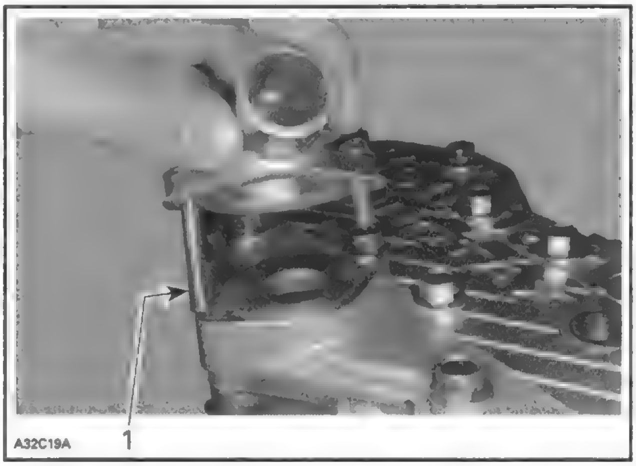
Cylinder Head Cover Installation

Torque screws to 29 N•m (21 lbf•ft) in the following illustrated sequence.



TYPICAL

Apply Loctite 243 (blue) (P/N 293 800 060) on the upper socket screw threads. Position the longer screw outwards (rear of engine).



TYPICAL
1. Longer screw

593 HO SDI Engine

Install knock sensor. Refer to *ENGINE MANAGEMENT (600 HO SDI)* section.

CYLINDER HEAD

Cylinder Head Removal

Remove the cylinder head cover as explained above.

Disconnect the temperature sensor connector.

Disconnect the carburetor or throttle body heater inlet hose at cylinder head.

Remove the cylinder head.

Cylinder Head Inspection

Check cylinder head for cracks, warp or other damages. Replace if necessary.

Cylinder Head Warpage

NOTE: Refer to *ENGINE MEASUREMENT* for the measurement procedures.

ENGINE	MAXIMUM
593	0.05 mm (.002 in) per 50 mm (2 in) of surface
	0.5 mm (.020 in) for total length of cylinder head

Cylinder Head Cleaning

Scrape off carbon formation from cylinder head.

Cylinder Head Installation

Install new rubber ring and round O-rings on each cylinder.

Replace O-rings around spark plug holes and on cylinder head border.

Install cylinder head cover as described above.

CYLINDER

Cylinder Removal

593 HO SDI Engine

Release the fuel pressure of the system using B.U.D.S. Look in the **activation** tab.

Unplug fuel injector connectors then remove the fuel rail. Refer to *FUEL SYSTEM*.

Unplug RAVE valve hose from solenoid.

All 593 Engines

Remove cylinder head as explained above.

Remove muffler, tune pipe and exhaust manifold. Refer to *EXHAUST SYSTEM*.

Remove acoustic panel.

Remove driven pulley and the countershaft bearing support, refer to *DRIVE SYSTEM/BRAKE*.

Disconnect carburetors or throttle body from intake adapters and set aside.

Unscrew cylinder screws and then remove the cylinder(s).

Cylinder Inspection

Check cylinders for cracks and scoring on the top and bottom of cylinders. Replace if necessary.

NOTE: Refer to *ENGINE MEASUREMENT* for the measurement procedures.

Cylinder Taper

ENGINE	MAXIMUM
All 593	0.10 mm (.004 in)

Cylinder Out of Round

ENGINE	MAXIMUM
All 593	0.08 mm (.003 in)

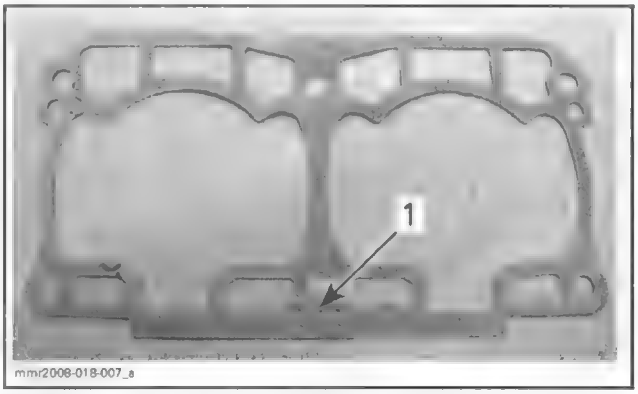
Cylinder Cleaning

Scrape off carbon formation from cylinder exhaust port.

Cylinder Installation

Install new base gasket of the same thickness as the old one.

Identify gasket thickness by the identification holes on the gasket surface.



TYPICAL
1. Identification holes

NOTE: The general procedure is to install a new gasket of the same thickness. However if you do not know the thickness of the gasket that was on the engine or if a crankcase and/or crankshaft repair was involved, measure the combustion chamber volume to choose the right gasket, refer to *ENGINE MEASUREMENT*.

CAUTION: Always install a gasket of the proper thickness. Failure to do so may cause detonation and severe engine damage.

Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

Install cylinders. Do not tighten.

Install new rubber ring and round O-rings on each cylinder.

NOTE: Carefully clean screws before reinstallation, specifically under screw head.

Install exhaust manifold with gaskets. Do not tighten yet.

Torque cylinder screws in a crisscross sequence as per the following table.

M8	29 N•m (21 lbf•ft)
M10	40 N•m (30 lbf•ft)

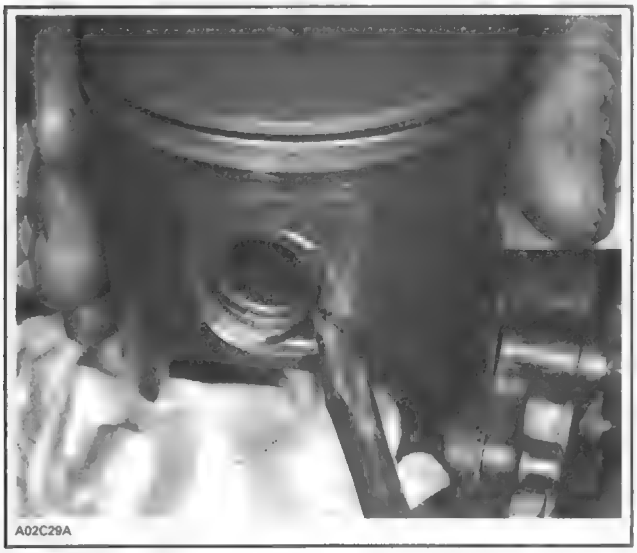
Install all other removed parts.

PISTON

Piston Removal

Remove cylinders, as explained above.

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase. Then with a pointed tool inserted in piston notch, remove both circlips from piston.



TYPICAL

Push piston pin out of piston.

Remove piston.

Remove bearing.

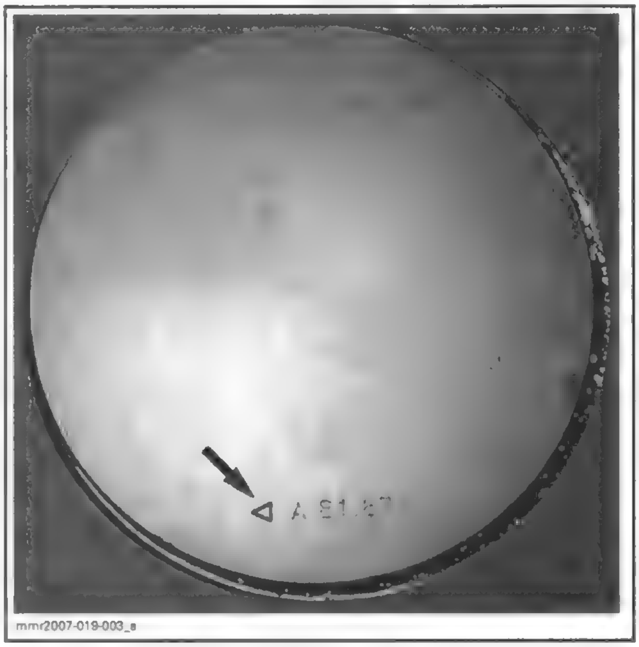
Piston Inspection

For dimension measurement procedures, refer to *ENGINE MEASUREMENT*.

Piston Cleaning

Scrape off carbon formation from piston dome.

NOTE: The arrow on the piston dome must be visible after cleaning.



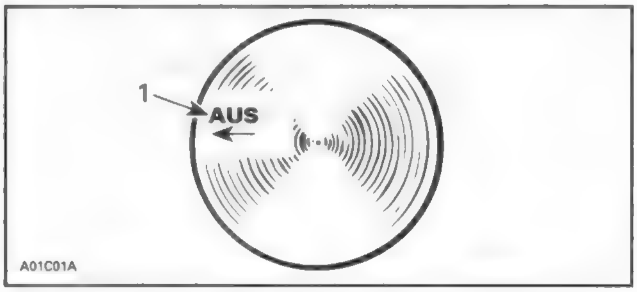
Clean the piston ring groove with a groove cleaner tool or with a piece of broken ring.

Piston Installation

Lubricate needle bearing with injection oil.

Insert bearing into connecting rod.

At assembly, place the pistons over the connecting rods with the letters "AUS" (over an arrow on the piston dome) facing towards the exhaust port.



1. Exhaust

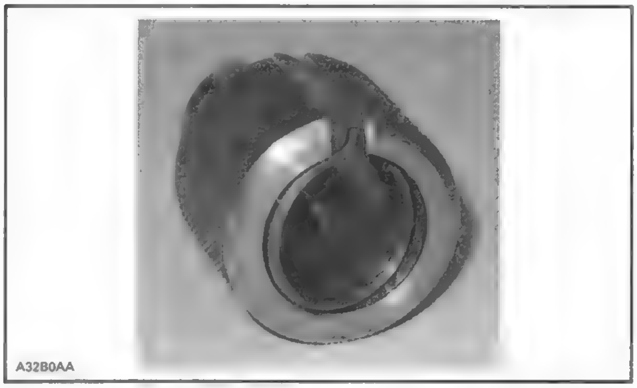
Push piston pin trough piston.

CAUTION: Always install new circlips.

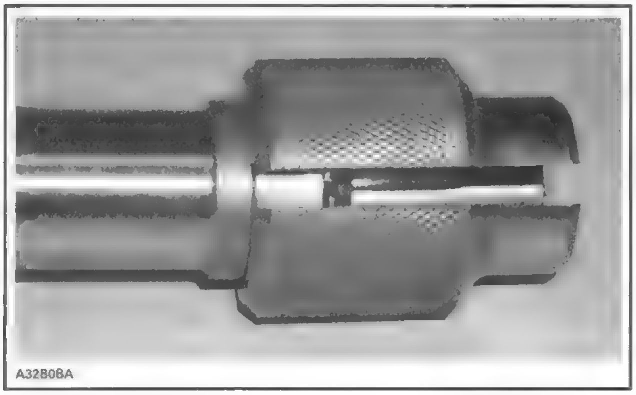
Use appropriate piston circlip installer to install mono-hook circlips.

ENGINE	TOOL
All 593	Piston circlip installer (P/N 529 035 686)

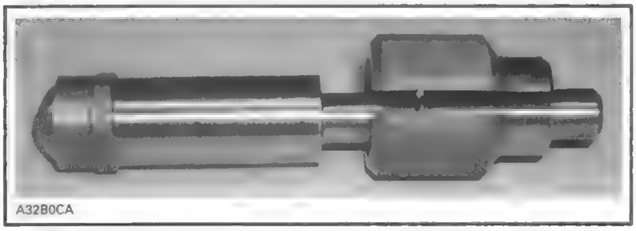
Insert circlip into support so that, when installed in piston groove, the gap will be below the tab (see piston picture below).

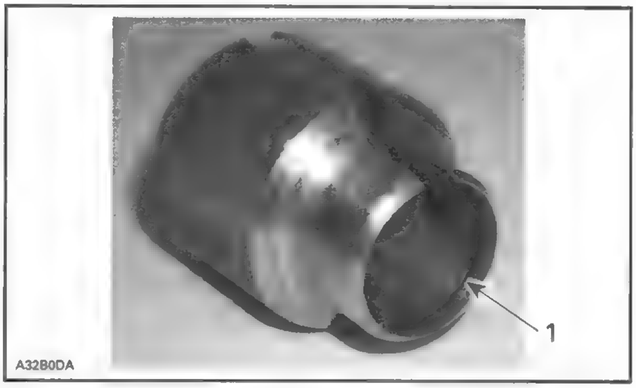


With round end of pusher, position circlip perpendicularly to the support axis.

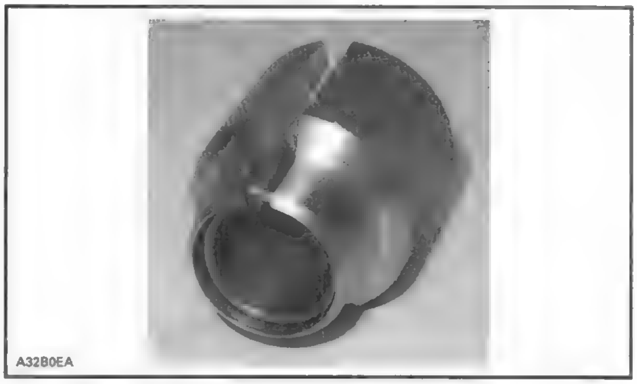


With the other end of the pusher, push circlip into the support groove.





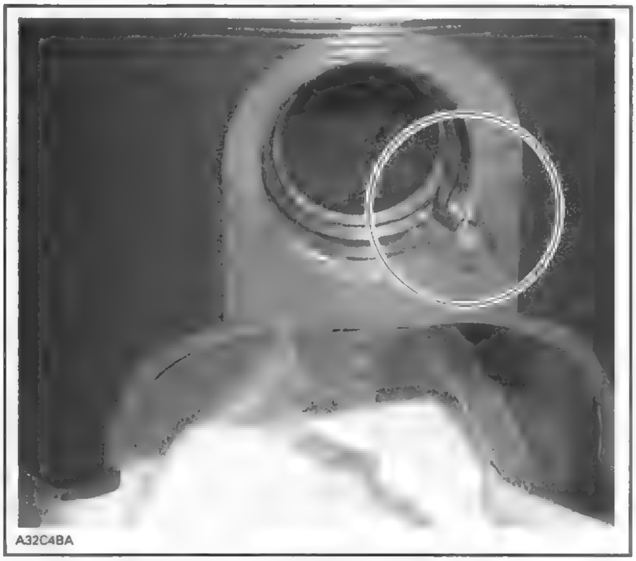
1. *Groove*



CIRCLIP READY TO BE INSTALLED ON PISTON

Using a plastic hammer, tap pusher to put circlip in place.

NOTE: Make sure to install new circlips with the gap below the tab exactly as shown on the following photo.



GAP BELOW THE TAB

CAUTION: Always install new mono-hook circlips. If circlip installation fails at the first attempt, always retry with a new one because, on a second attempt, the circlip will lose its normal retaining capabilities.

CAUTION: Circlips must not move freely after installation; if so, replace them.

Install all other removed parts.

TOP END (797)

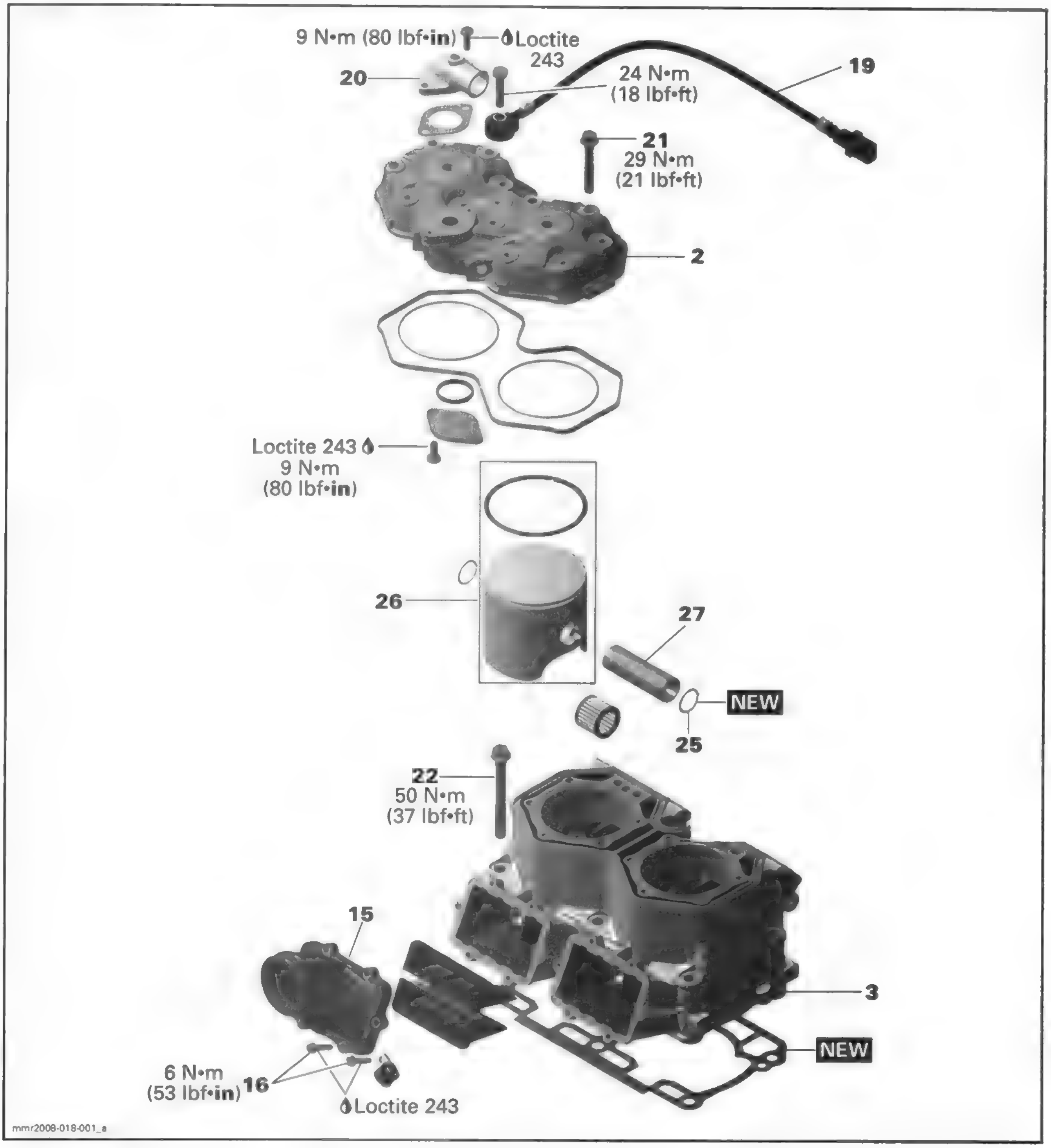
SERVICE TOOLS

Description	**Part Number**	**Page**
vacuum/pressure pump	529 021 800	122
rubber pad	529 023 400	133
Piston circlip installer	529 035 563	134

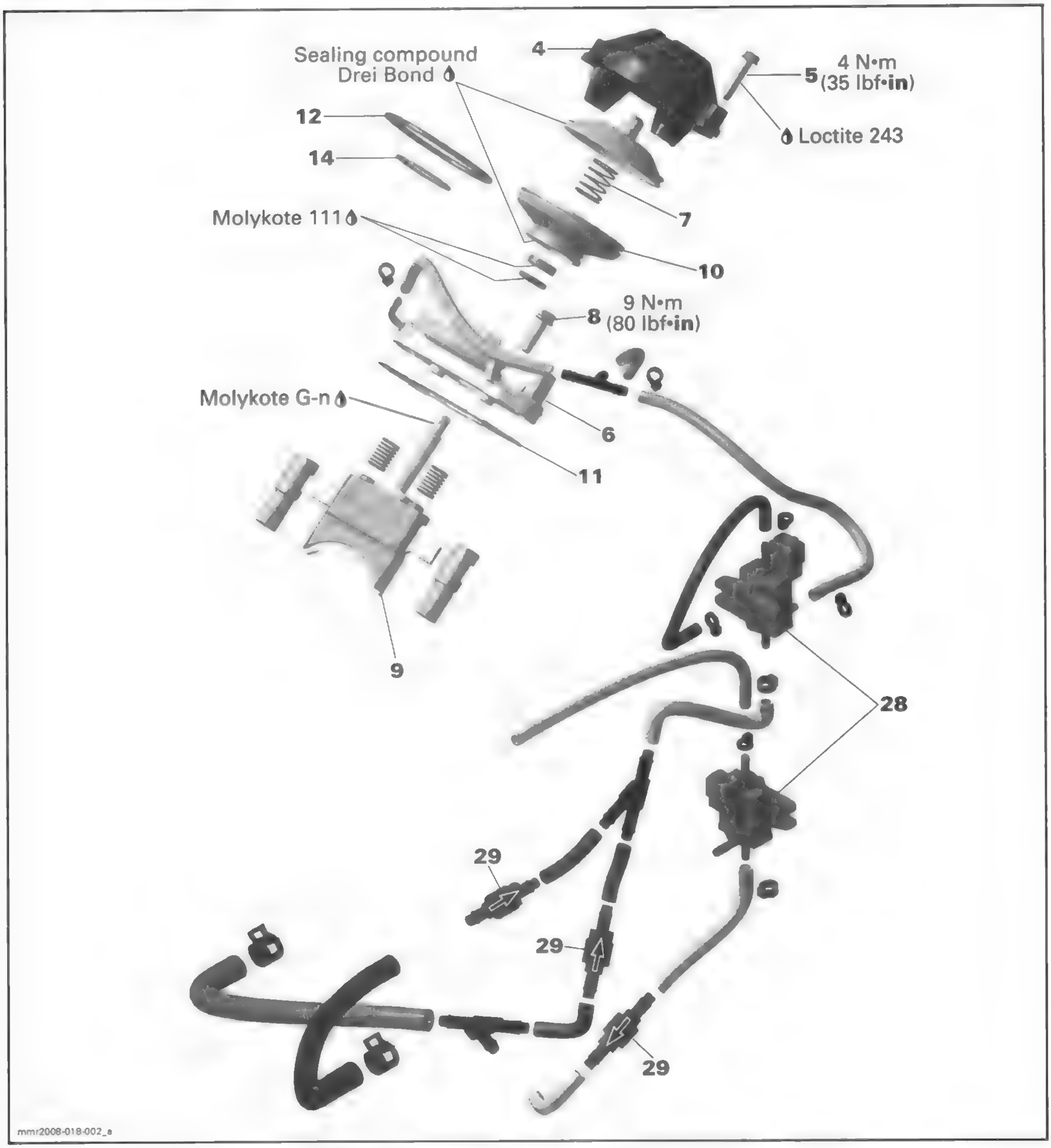
SERVICE PRODUCTS

Description	**Part Number**	**Page**
Loctite Chisel	413 708 500	116
Molykote G-n	420 297 433	126
Drei Bond sealing compound	420 297 906	126

TOP END


9 N•m (80 lbf•in)
Loctite 243
20
24 N•m (18 lbf•ft)
19
21
29 N•m (21 lbf•ft)
2
Loctite 243
9 N•m (80 lbf•in)
26
27
NEW
25
22
50 N•m (37 lbf•ft)
15
3
NEW
6 N•m (53 lbf•in)
16
Loctite 243
mmr2008-018-001_a

RAVE VALVE


4
Sealing compound
Drei Bond
5
4 N•m
(35 lbf•in)
Loctite 243
12
14
7
Molykote 111
10
8
9 N•m
(80 lbf•in)
Molykote G-n
6
11
9
28
29
29
29
mmr2008-018-002_a

GENERAL

Before completely disassembling the engine, check airtightness. Refer to *ENGINE LEAK TEST*.

To measure internal parts, refer to *ENGINE MEASUREMENT* section.

During assembly/installation, use torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS PROCEDURE* and *LOCTITE APPLICATION PROCEDURE* at the beginning of this manual for complete procedure.

> **⚠ WARNING**
>
> **Torque wrench tightening specifications must be strictly adhered to.**
> **Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.) must be replaced with new ones.**

Cleaning Procedures

Discard all gaskets and O-rings. Use Loctite Chisel (P/N 413 708 500) to clean mating surfaces.

Clean all metal components in a non-ferrous metal cleaner.

PROCEDURES

REED VALVE

Reed Valve Removal

Remove carburetors, refer to *FUEL SYSTEM* section.

Unscrew screws **no. 16** retaining intake adapters then remove reed valves.

Reed Valve Inspection

Check reed valve for proper tightness. There must not be any play between blade and valve body when exerting a finger pressure on blade at blade stopper location.

In case of a play, turn blade upside down and recheck. If there is still a play, replace blade and/or valve body.

NOTE: Blades have a curved shape. Install with their curve facing reed block.

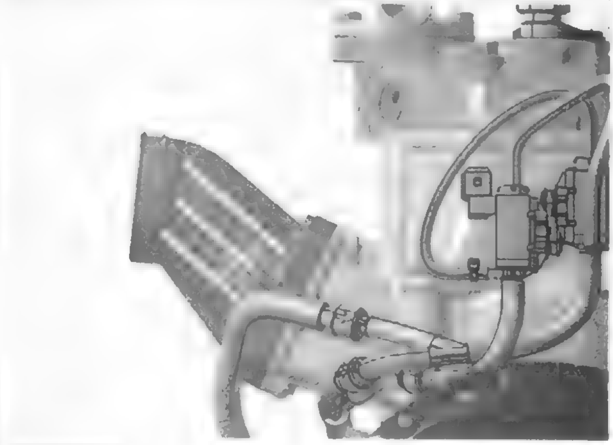
Reed Valve Installation

The installation is the reverse of the removal procedure. Pay attention to the following.

Ensure to position reed valves so that they rest flat in intake opening.

mmr2007-019-004_a

Ensure to position intake adapter as shown.



mmr2008-018-005

3D RAVE VALVE

3D RAVE Basic Operation

3-step RAVE valves are used. Their positions vary according to engine operating condition.

The RAVE valve steps are:

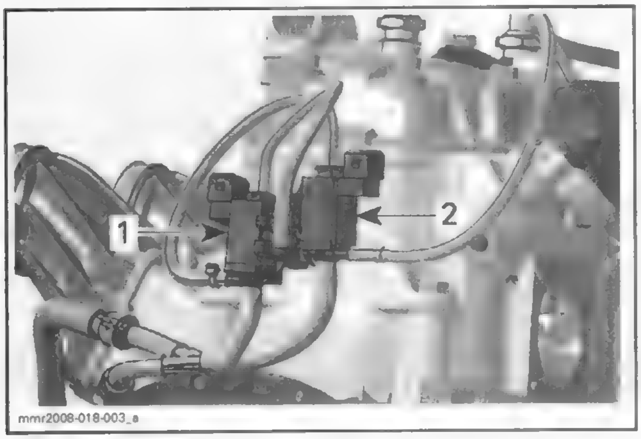
- Fully closed
- Partially opened
- Fully opened.

RAVE valves are activated by 2 solenoids that are controlled by the ECM through mappings.

Many different mappings are used by the ECM to control the 3D RAVE valves. The mappings are based on current engine RPM, crankshaft rate of acceleration or deceleration and the following inputs: intake temperature, TPS, knock sensor, engine coolant temperature and APS.

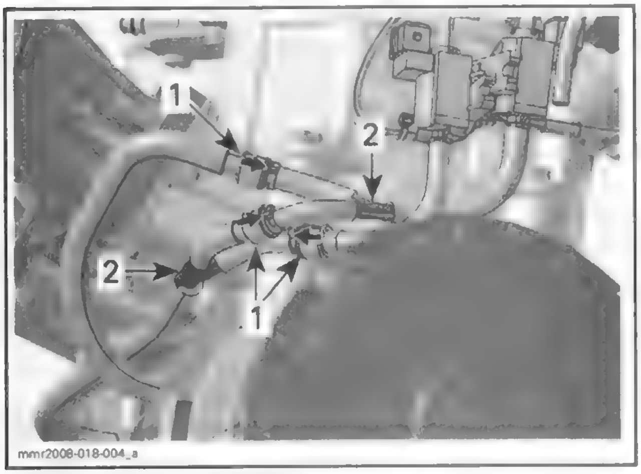
NOTE: 3D RAVE valves may go through all 3 positions or skip the partially open position and go directly to either the fully open or closed positions depending how quickly the throttle is depressed and the engine load.

Solenoids use crankcase pulses (pressure and vacuum) to open or close the valves:



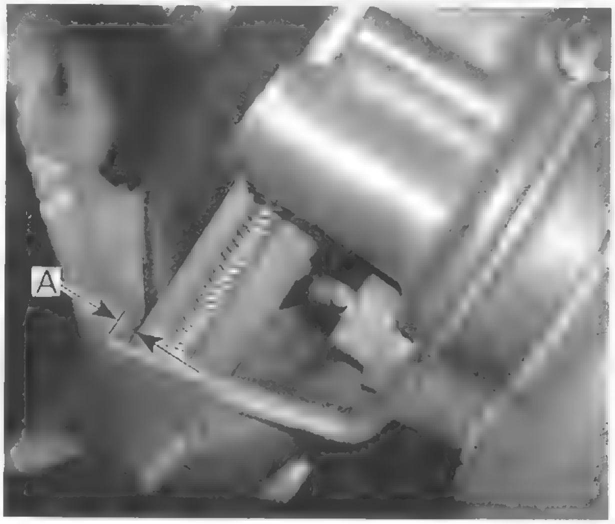
1. Vacuum solenoid
2. Pressure solenoid

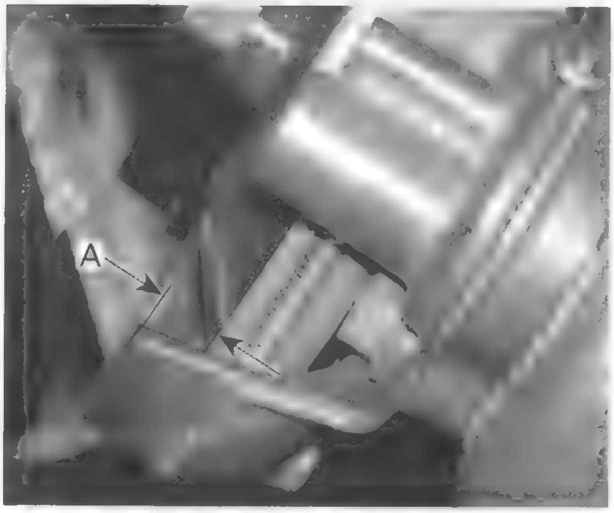
An arrangement of check valves and Y-fittings allows to separate the crankcase vacuum pulses from the pressure pulses.



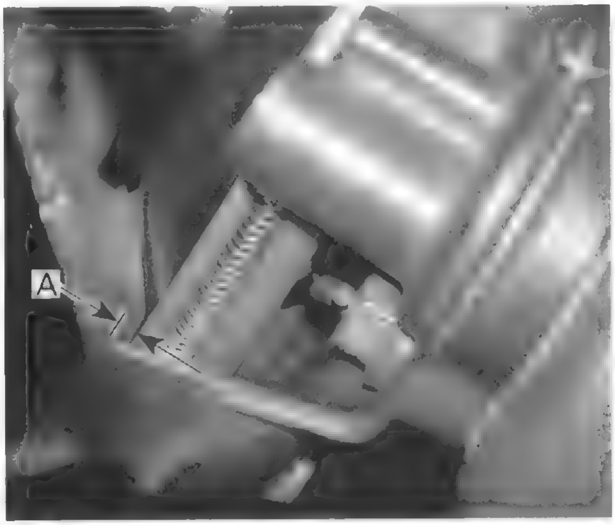
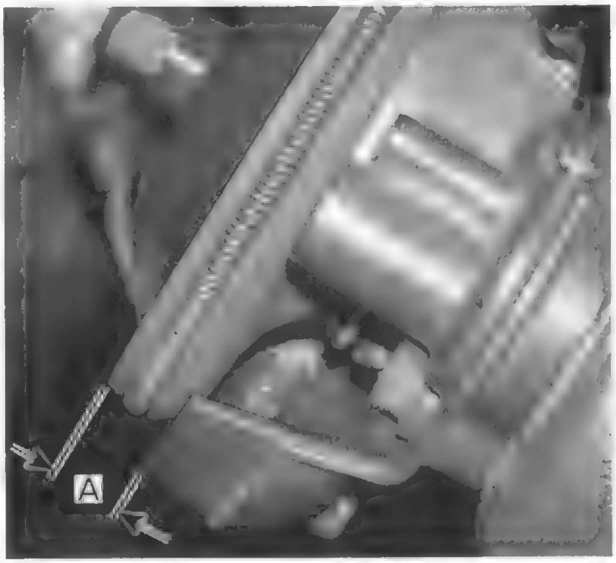
CHECK VALVE ORIENTATION
1. Arrows on check valves
2. Arrows on Y-fittings

3D RAVE Position According to Engine Operation

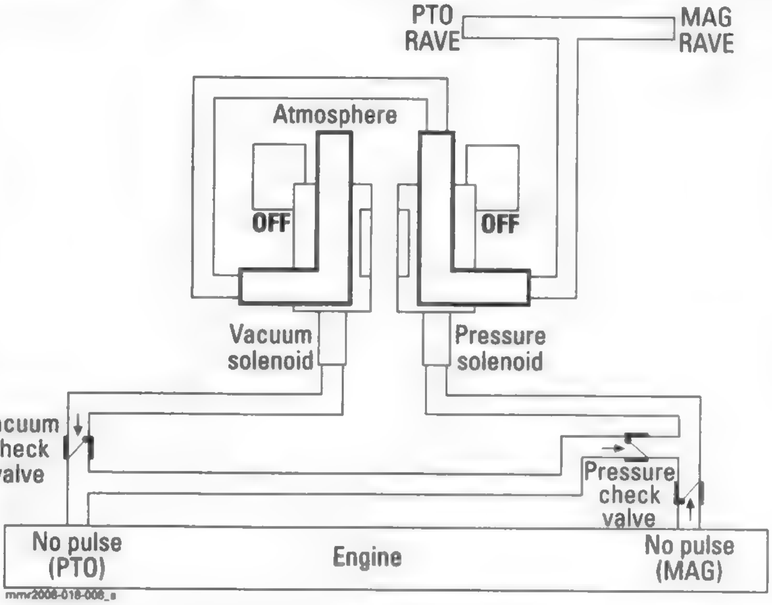
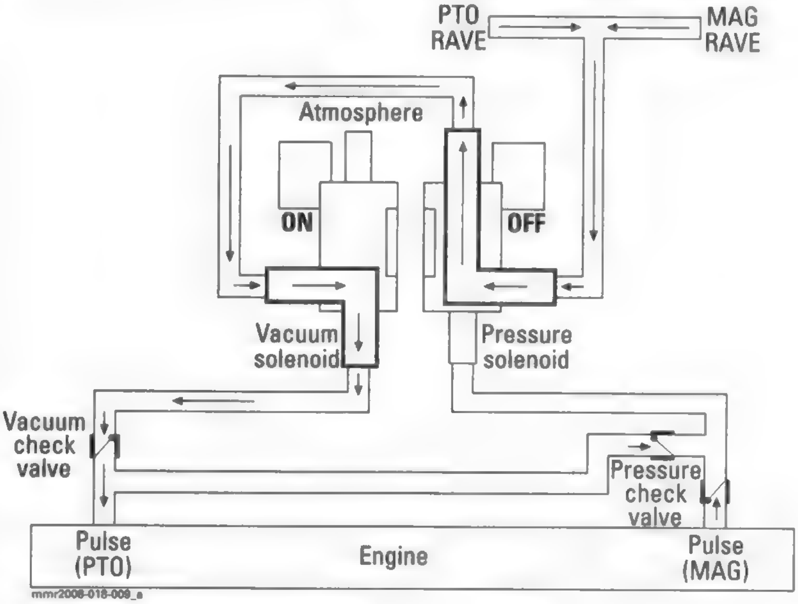
<table>
<tr><th>ENGINE OPERATION</th><th colspan="2">RAVE VALVE POSITION
MEASURED FROM TOP OF GREEN BELLOW TO EDGE OF RAVE HOUSING</th></tr>
<tr><td>Engine stopped</td><td>Partially open</td><td>

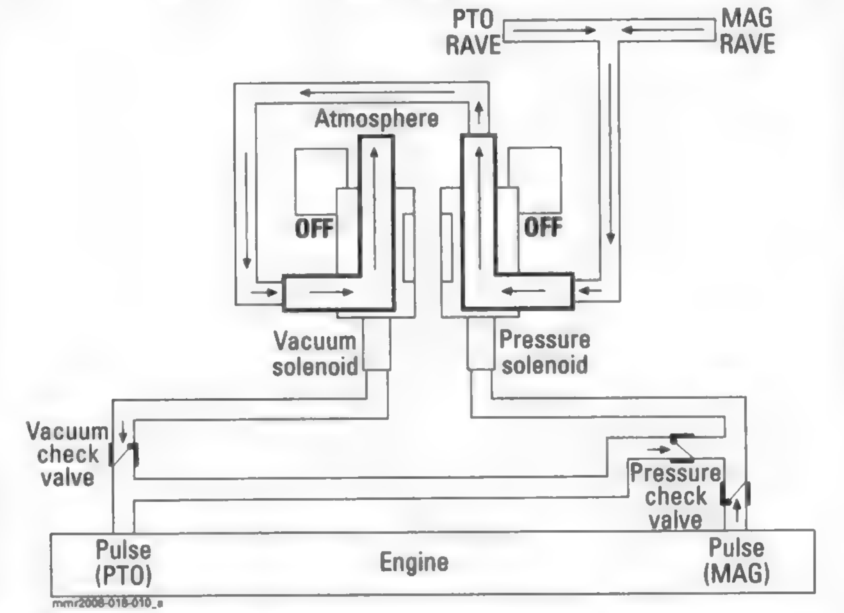
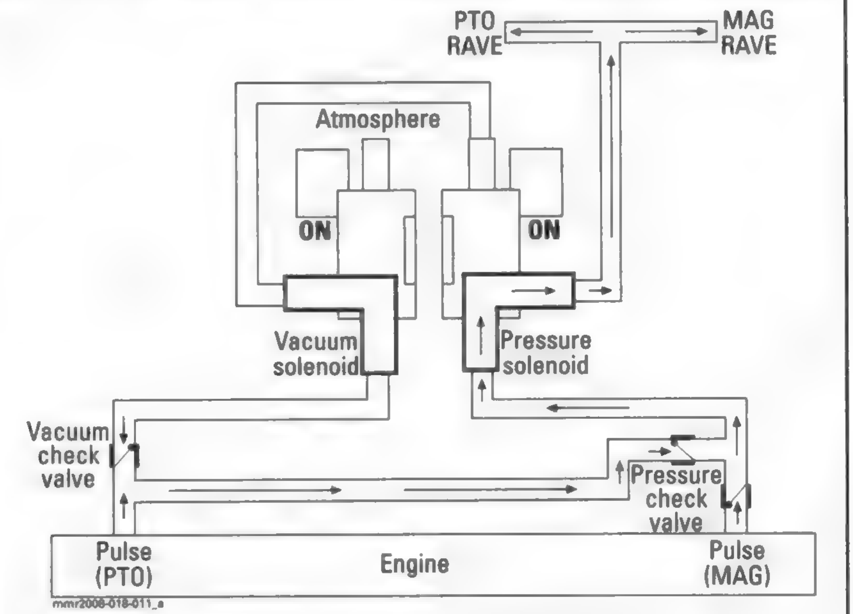
mbs2007-015-002_a
A: Approx. 1 mm (1/32 in) down</td></tr>
<tr><td>Idle to approx. 6200 RPM</td><td>Fully closed</td><td>

mbs2007-015-001_a
A: Approx. 6 mm (1/4 in) down</td></tr>
</table>

ENGINE OPERATION	RAVE VALVE POSITION MEASURED FROM TOP OF GREEN BELLOW TO EDGE OF RAVE HOUSING	
Approx. 6200 to 7900 RPM (typical trail riding)	Partially opened	**NOTE:** Same as engine stopped position.  mbs2007-015-002_a A: Approx. 1 mm (1/32 in) down
Approx. 7900 RPM to top RPM	Fully opened	 mbs2007-015-003_a A: Approx. 8 mm (5/16 in) up

Solenoid State According to Engine Operation

ENGINE OPERATION	VACUUM SOLENOID	PRESSURE SOLENOID	DIAGRAM
Engine stopped	OFF	OFF	 PTO RAVE MAG RAVE Atmosphere OFF OFF Vacuum solenoid Pressure solenoid Vacuum check valve Pressure check valve No pulse (PTO) Engine No pulse (MAG) mmr2008-018-008_a
Idle to approx. 6200 RPM	ON	OFF	 PTO RAVE MAG RAVE Atmosphere ON OFF Vacuum solenoid Pressure solenoid Vacuum check valve Pressure check valve Pulse (PTO) Engine Pulse (MAG) mmr2008-018-009_a

ENGINE OPERATION	VACUUM SOLENOID	PRESSURE SOLENOID	DIAGRAM
Approx. 6200 to 7900 RPM (typical trail riding)	OFF	OFF	
Approx. 7900 RPMto top RPM	ON	ON	

PTO RAVE
MAG RAVE
Atmosphere
OFF
OFF
Vacuum solenoid
Pressure solenoid
Vacuum check valve
Pressure check valve
Pulse (PTO)
Engine
Pulse (MAG)
mmr2008-018-010_a

PTO RAVE
MAG RAVE
Atmosphere
ON
ON
Vacuum solenoid
Pressure solenoid
Vacuum check valve
Pressure check valve
Pulse (PTO)
Engine
Pulse (MAG)
mmr2008-018-011_a

3D RAVE Valve Adjustment

There are no adjustments to be periodically checked.

3D RAVE Valve Troubleshooting

Refer to the following table for engine behavior related to solenoid malfunction.

ENGINE RPM	VACUUM SOLENOID	PRESSURE SOLENOID	RAVE POSITION	ENGINE BEHAVIOR
Idle to approx. 6200 RPM	Defective	Defective	Partially open	Poor acceleration
	Defective	Functional	Partially open	Poor acceleration
	Functional	Defective	Fully closed	Normal operation
Approx. 6200 to 7900 RPM	Defective	Defective	Partially open	Normal operation
	Defective	Functional	Partialy open	Normal operation
	Functional	Defective	Partialy open	Normal operation
Approx. 7900 RPM to top RPM	Defective	Defective	Partialy open	Cannot reach top RPM
	Defective	Functional	Fully open	Normal operation
	Functional	Defective	Fully closed	Cannot reach top RPM

Intermittent Engine Performance Problem

Check transmission (belt, drive and driven pulleys).

If engine does not always reach maximum RPM: Check 3D RAVE valves as per *3D RAVE VALVE INSPECTION* in this section. Then, proceed with *DIAGNOSTIC FLOW CHART* to validate 3D RAVE operation.

3D RAVE Valve Diagnostic with Flow Chart

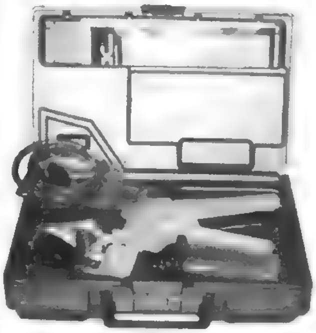
Install B.U.D.S. and ensure there are no fault codes (active or occured).

A flow chart in the *TROUBLESHOOTING* section of this manual will validate proper operation of 3D RAVE valves or assist when troubleshooting a malfunctioning 3D RAVE valves system.

3D RAVE Valve Leak Test

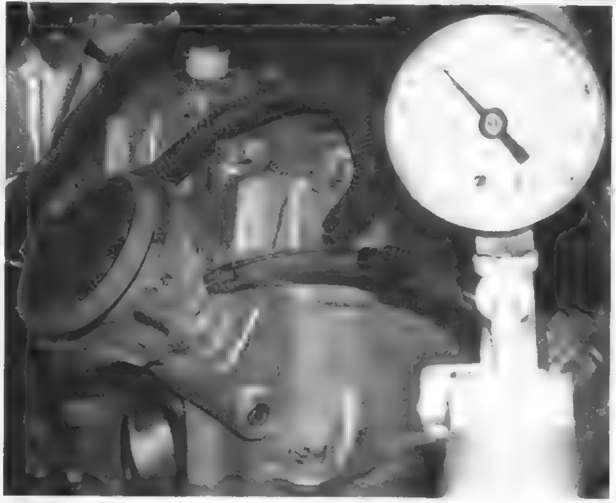
NOTE: Test each RAVE individually.

Use the vacuum/pressure pump (P/N 529 021 800).



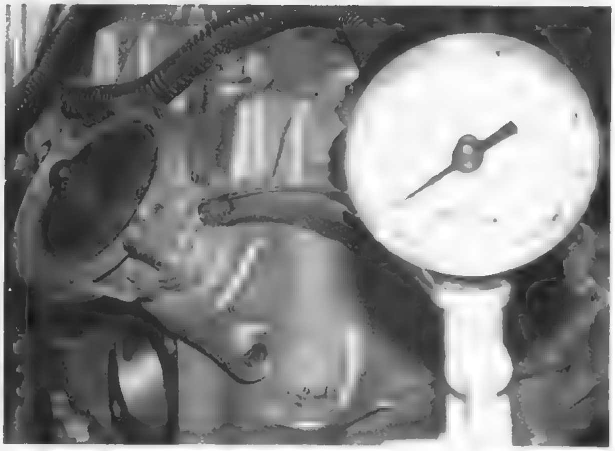
Unplug the RAVE inlet hose.

Install test pump on nipple and apply pressure. Piston should fully rise. Otherwise or if it lowers rather quickly, check bellow and seals inside RAVE valve.



mmr2007-019-033

Then, apply vacuum. Piston should fully lower. Otherwise or if it rises rather quickly, check bellow and seals inside RAVE valve.



mmr2007-019-035

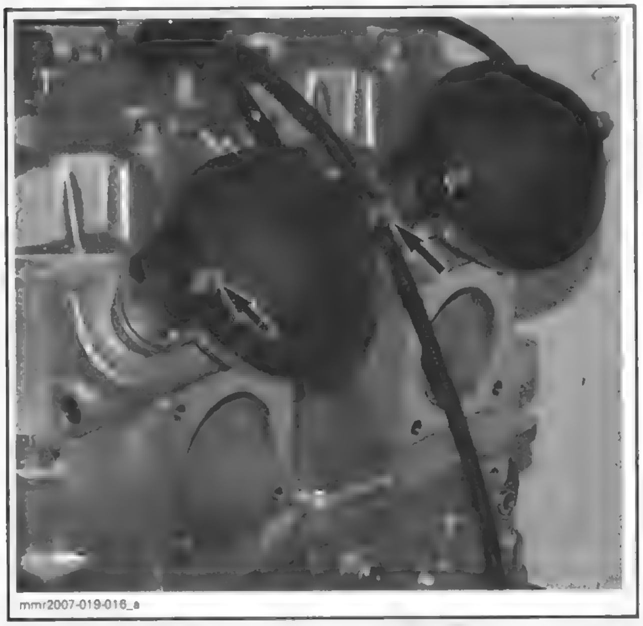
For check valves and solenoids leak tests, refer to *3D SOLENOIDS AND CHECK VALVES* in this section.

3D RAVE Valves Removal

Remove LH side panel.

Remove tool kit support located on drive belt guard.

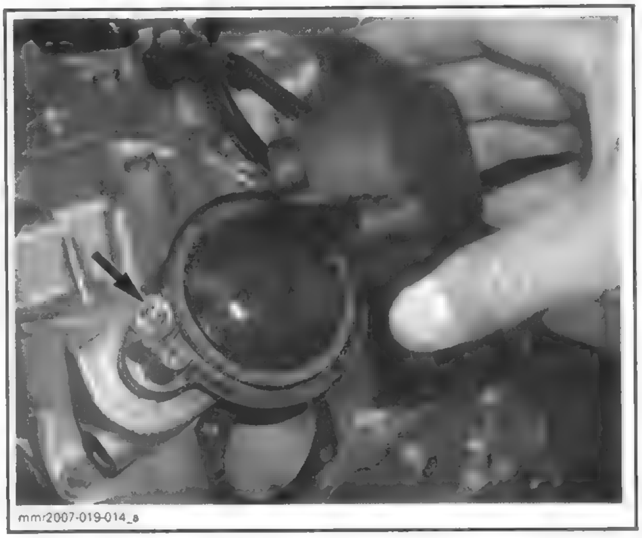
Remove 3D RAVE valve cover **no. 4** by removing screws **no. 5**.



mmr2007-019-016_a

mmr2007-019-014

Remove screws **no. 8**.



mmr2007-019-014_a

Pull valve assembly out.

mmr2007-019-015

NOTE: Be careful not to loose springs underneath housing.

3D RAVE Valve Disassembly

Carefully remove spring **no. 12** retaining bellow **no. 10** to valve piston.

mmr2007-019-026

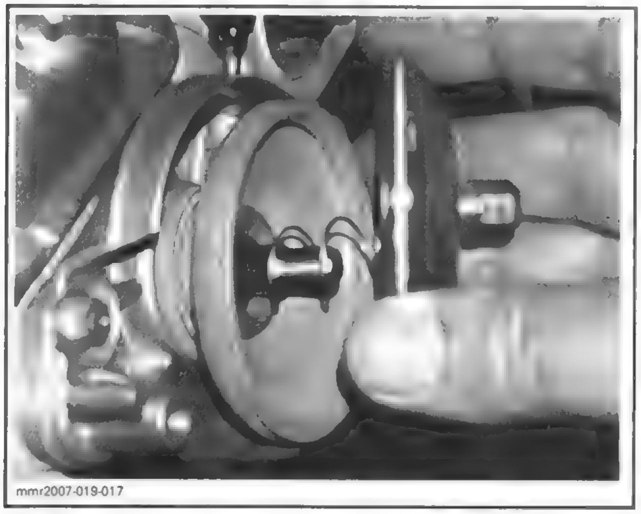
TYPICAL

Free bellow from valve piston.

Carefully unscrew valve piston then remove compression spring.

⚠ WARNING

Firmly hold valve piston. The compression spring no. 7 inside the valve is applying pressure against the piston.



mmr2007-019-017

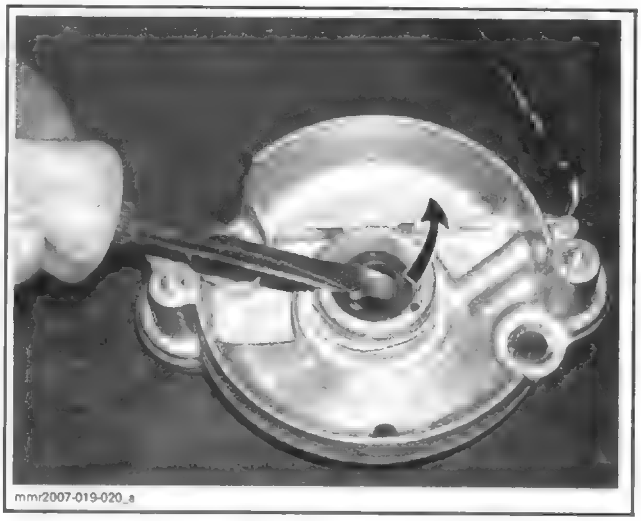
TYPICAL

Carefully remove bellow **no. 10** from valve housing **no. 6**.

If oil is found in housing area, replace seals.

Extract RAVE valve from housing.

To remove seals, carefully pry them out.



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3D RAVE Valve Cleaning

Clean carbon deposits. Cleaning intervals depend upon the user's riding style and the quality of the oil used.

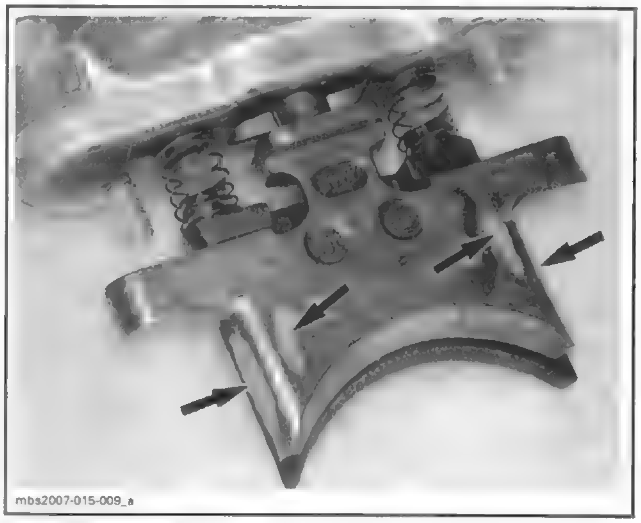
BRP suggests annual cleaning of the valve. If a customer uses lower quality oil than recommended, more frequent cleaning may be required.

No special solvents or cleaners are required when cleaning the valve.

3D RAVE Valve Inspection

Check valves for breakage.

Check valves for wear at sliding points and straightness.



mbs2007-015-009_a

SIGNS OF WEAR

Check spring condition and straightness.

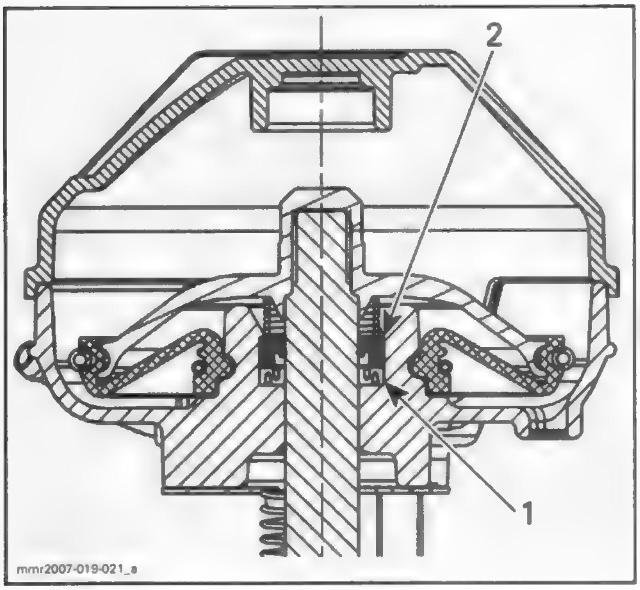
NOTE: Oil dripping from draining hole indicates a loosen spring or damaged bellows.

Check for cracked, dried or perforated bellows **no. 10**.

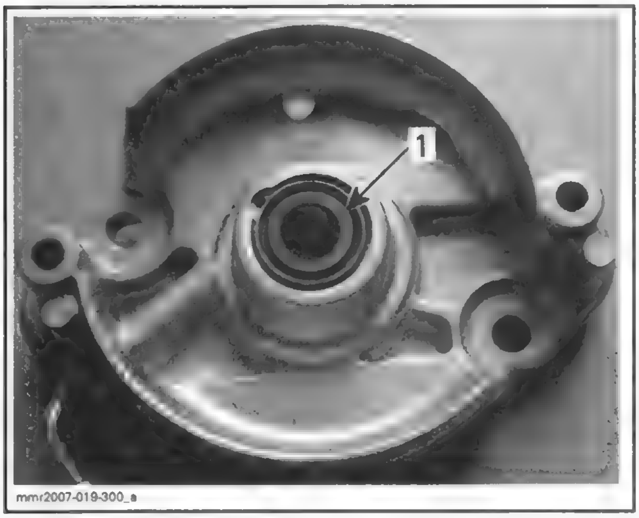
NOTE: Make sure hoses are not leaking, kinked or damaged.

3D RAVE Valve Assembly

Position parts as per illustrations.


2
1
mmr2007-019-021_a

1. *Oil seal*
2. *Gasket ring*

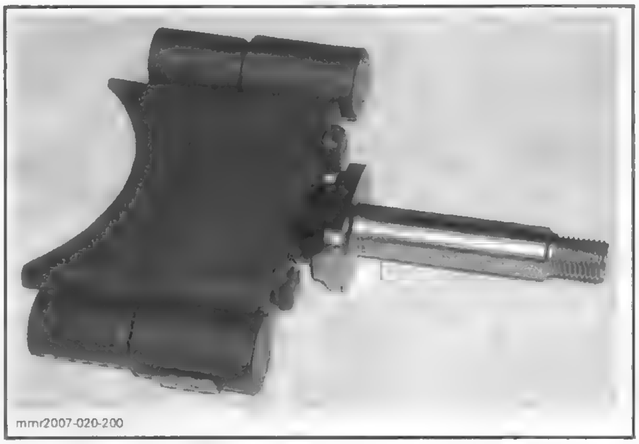

1
mmr2007-019-300_a

1. *Lettering of oil seal on top*

Use an appropriate pusher to reinstall seals.

mmr2007-019-022

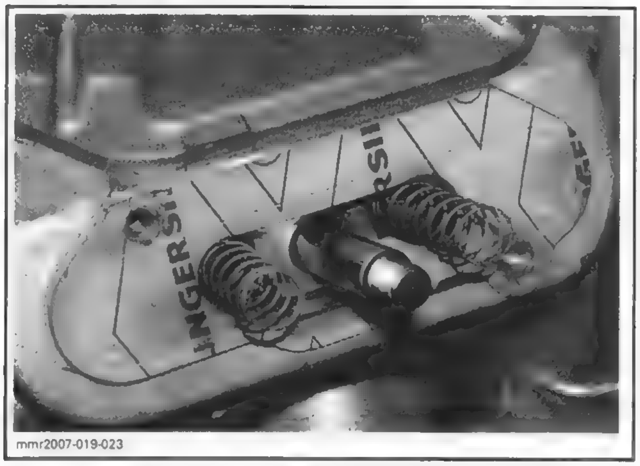
Assemble together the main and side valves.


mmr2007-020-200

Insert valves together in cylinder. Install gasket.

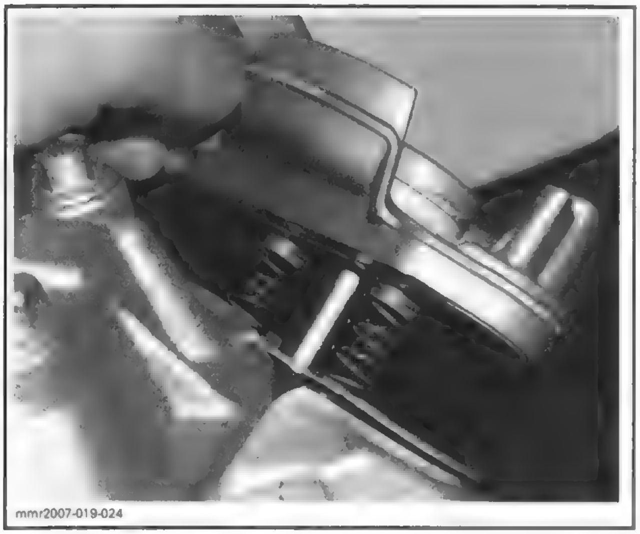
mmr2007-019-019_b

Align springs on stud ends of valves.


mmr2007-019-023

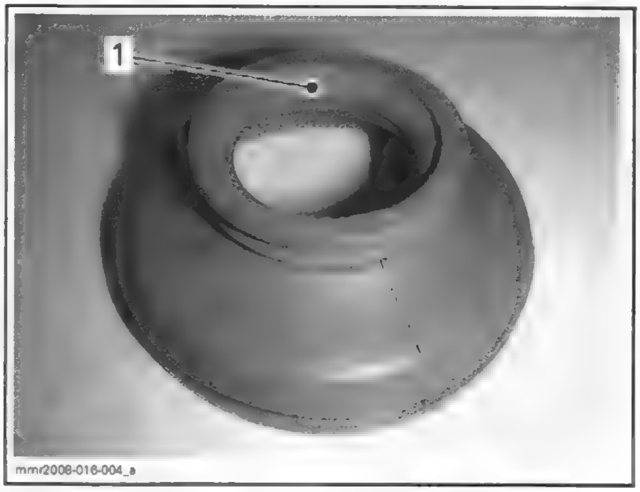
Apply Molykote G-n (P/N 420 297 433) to valve shaft and on seals in housing.

Install housing and carefully align springs on stud ends of housing.


mmr2007-019-024

Install lower spring **no. 14** on bellow.

Apply Drei Bond sealing compound (P/N 420 297 906) on the bellow lower rib, then install bellow and spring.

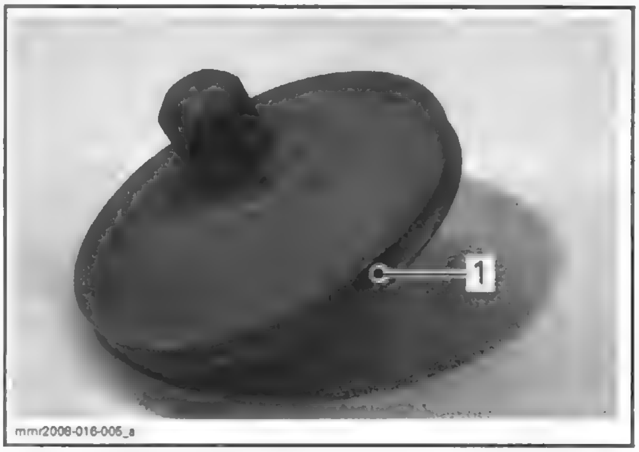


mmr2008-016-004_a

1. *Apply Drei Bond here*

Install compression spring **no. 7** then tighten valve piston.

Apply Drei Bond sealing compound (P/N 420 297 906) on valve piston groove.

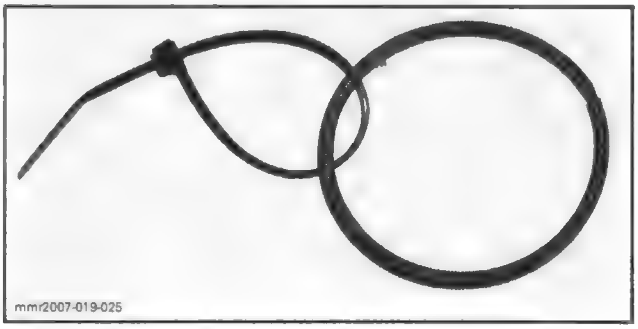


mmr2008-016-005_a

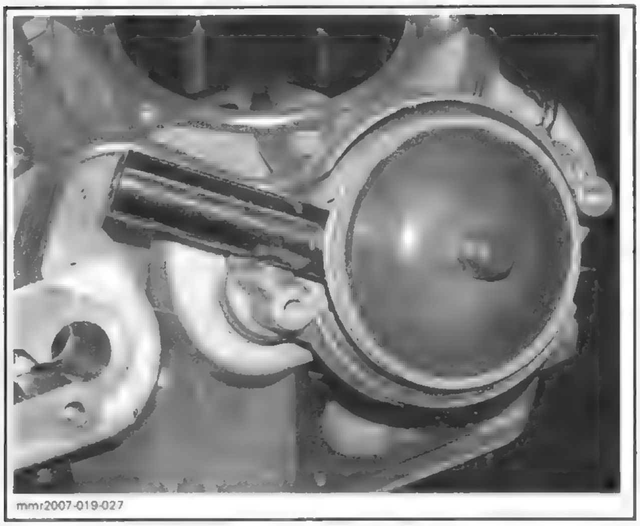
1. *Apply Drei Bond here*

position bellow on valve piston then secure top spring **no. 12** as follows.

Attach a locking tie to spring.

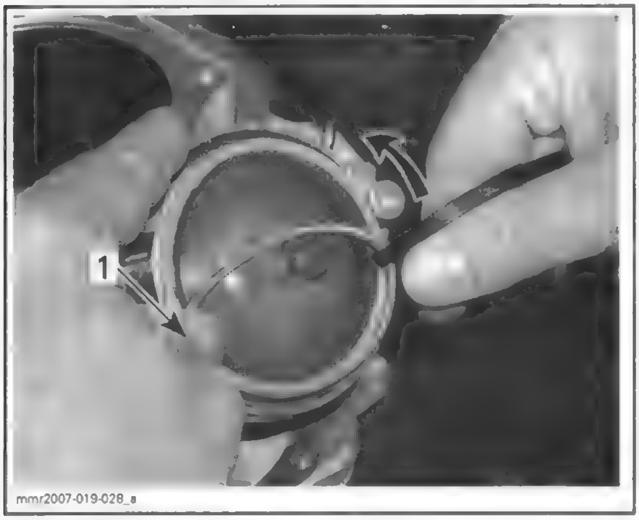

mmr2007-019-025

Block valve piston with a suitable socket.


mmr2007-019-027

Position joint of spring under your thumb.

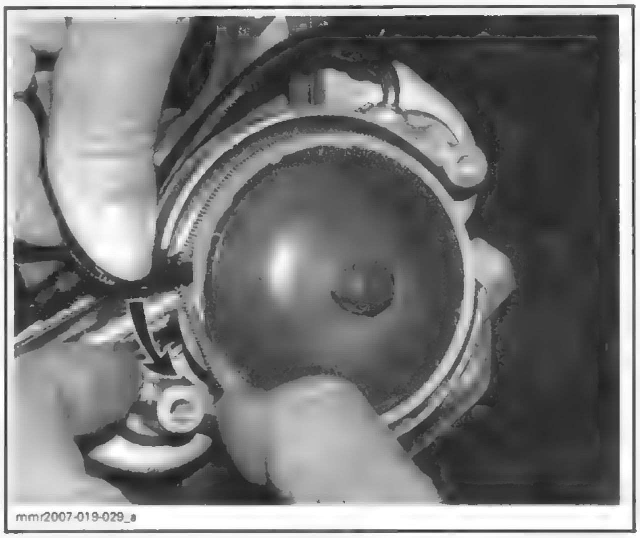
Hold spring with your thumb while sliding spring on the other side using the locking tie.



mmr2007-019-028_a

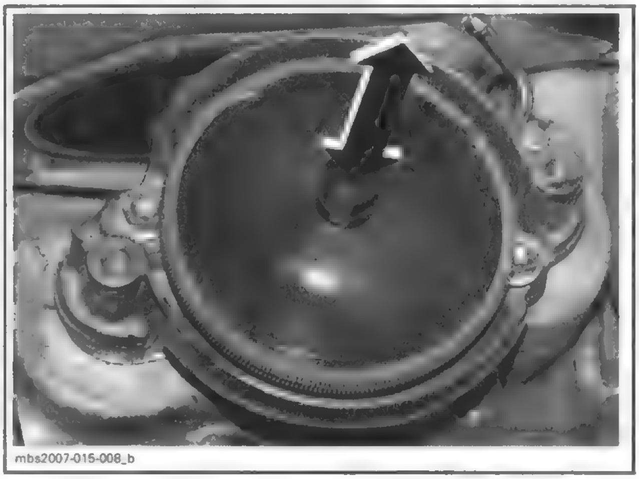
1. *Joint of spring under thumb*

Continue sliding locking tie all around the edge of valve piston.

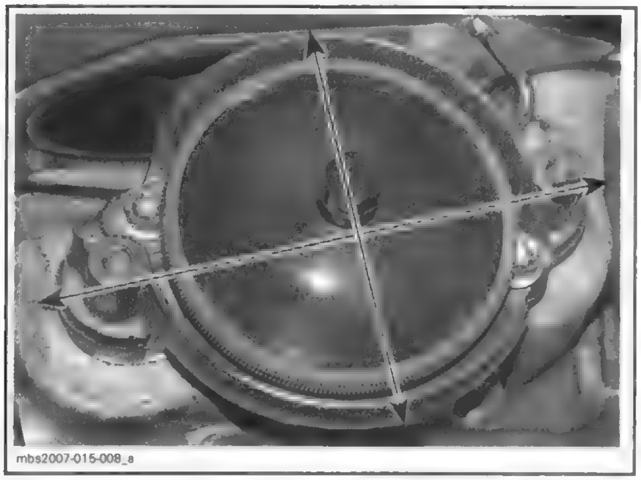

mmr2007-019-029_a

NOTE: Take care there is no strain in the bellow that could apply some bending force or torsion to the 3D RAVE valve. That may contribute to a RAVE valve jam.

Push and pull valve piston to make sure it moves freely.


mbs2007-015-008_b

When installing valve assembly in its housing, center valve horizontally and longitudinally then hand tighten screws.



Tighten screws and check valve for free movement again. If some friction is felt, slightly loosen screws and readjust housing then retighten screws.

Repeat the process until a free movement is obtained.

Start engine and recheck RAVE system operation.

Reinstall remaining parts.

CHECK VALVES (3D RAVE VALVES)

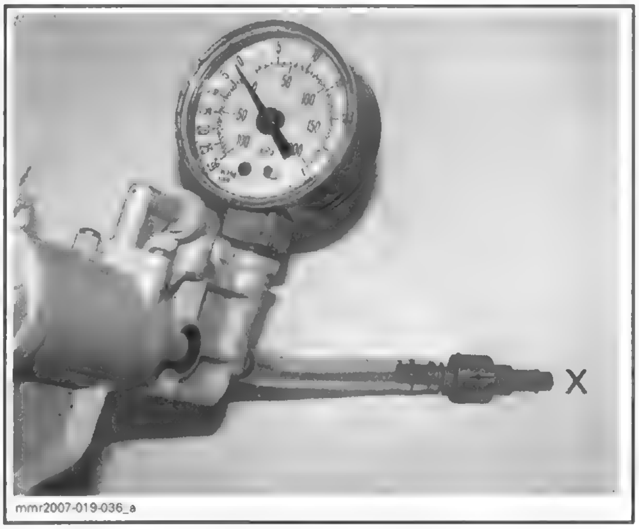
Check Valve Leak Test

Disconnect check valve.

Install test pump as shown.

Pressurize check valve to 5 PSI (34 kPa).

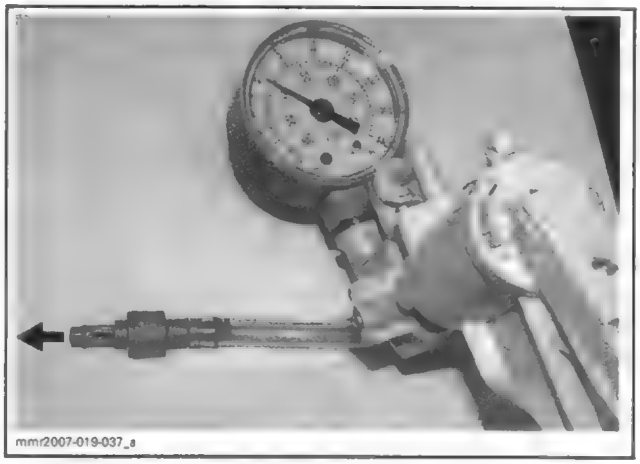
- Valve should stand pressure.



Install test pump in the opposite side.

Pressurize check valve.

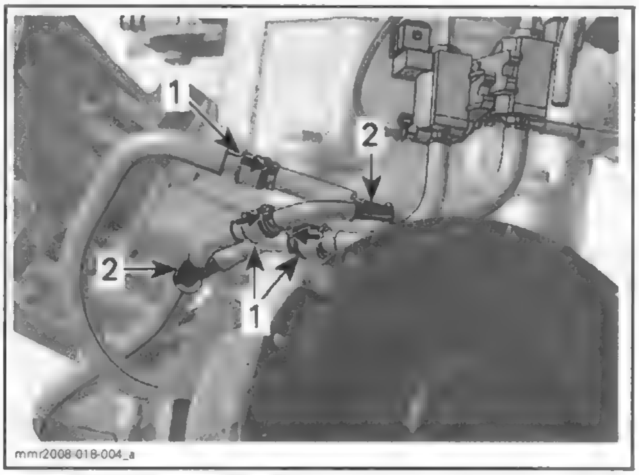
- Air should flow freely.



Replace valve if any test failed.

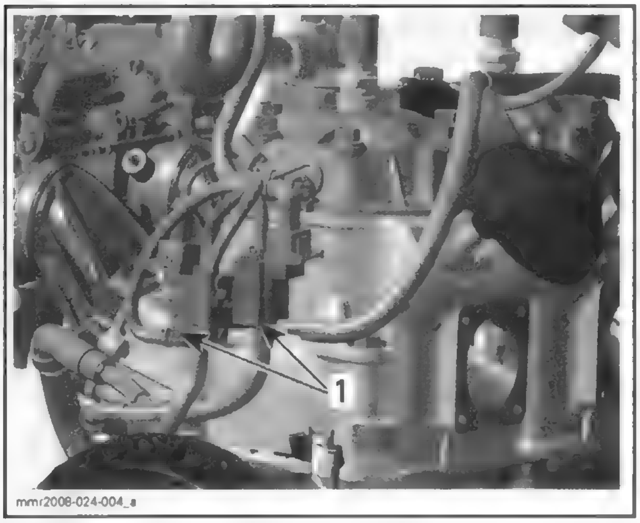
Check Valve Installation

Ensure to reinstall all check valves in the proper direction.



CHECK VALVE ORIENTATION
1. Arrows on check valves
2. Arrows on Y-fittings

SOLENOIDS (3D RAVE VALVES)



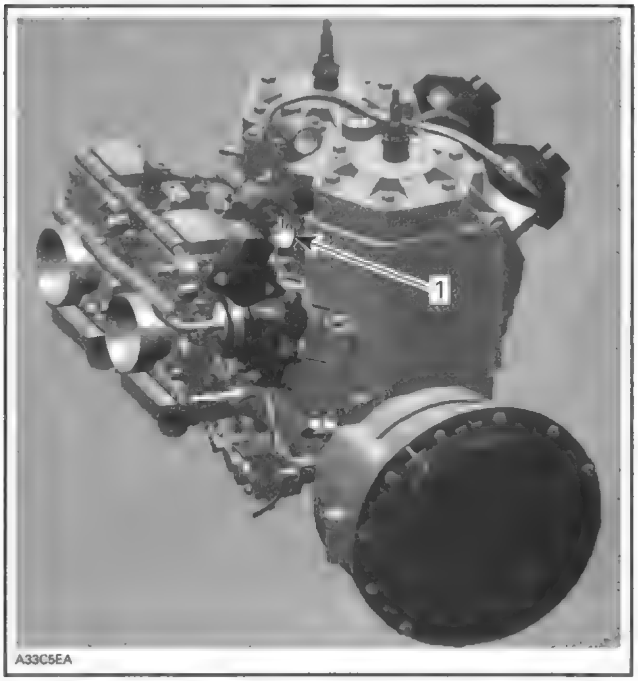
TYPICAL
1. RAVE solenoids

NOTE: First ensure the problem is not related with tubes connection and RAVE valves themselves.

Solenoid Test with B.U.D.S.

Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* for proper connection to vehicle.

Using B.U.D.S. software, energize **RAVE solenoids** from **Activation** tab.

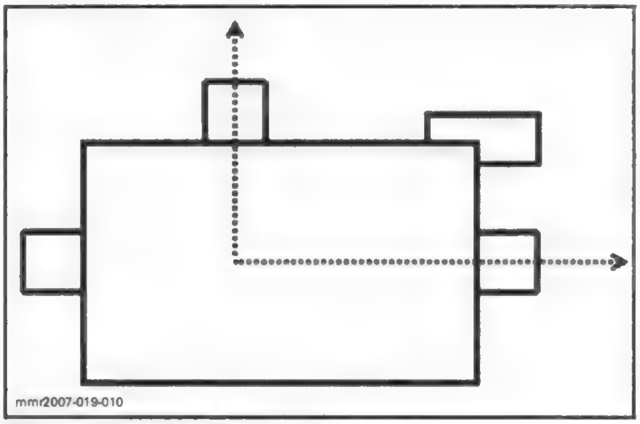


TYPICAL
1. Activate here

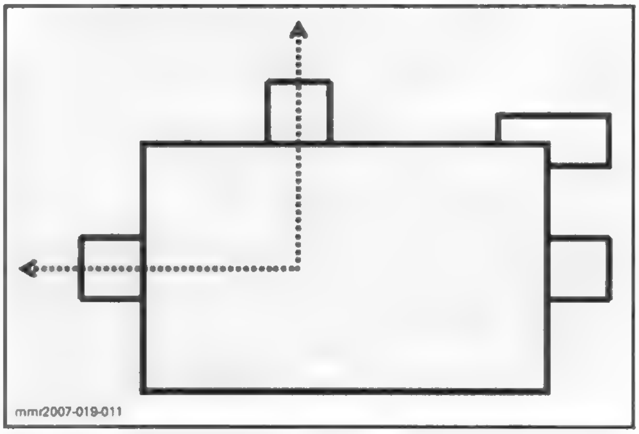
This will validate the RAVE solenoid mechanical and electrical operation.

If the solenoid does not work, proceed with the voltage test.

Solenoid Leak Test



SOLENOID OPERATION (OFF)



SOLENOID OPERATION (ON)

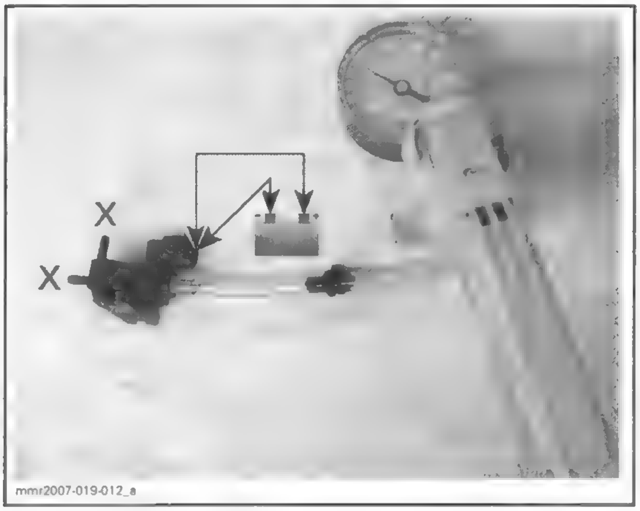
NOTE: Test each solenoid individually.

Unplug supply hose from solenoid.

Install test pump on solenoid nipple.

Supply 12 Vdc to solenoid terminals. Ensure to respect polarity.

Pressurize solenoid.



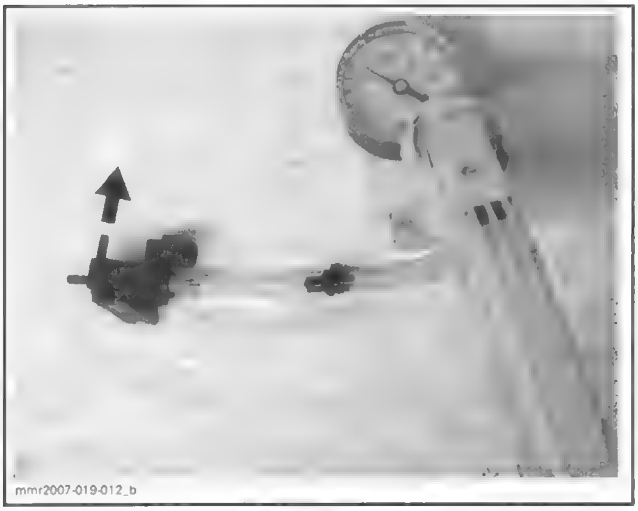
mmr2007-019-012_a

TEST PRESSURE
69 - 103 kPa (10 - 15 PSI)

Wait some time to see if pressure drops:

- If pressure does not build up or drops, replace solenoid.
- If pressure is maintained, continue testing.

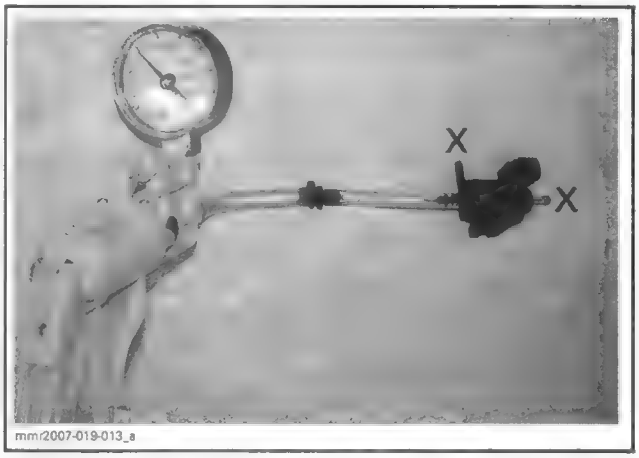
Disconnect solenoid. Pressure should evacuate through upper nipple.



mmr2007-019-012_b

Unplug outlet hose from solenoid.

Install test pump on solenoid nipple. Pressurize to the same pressure as before.



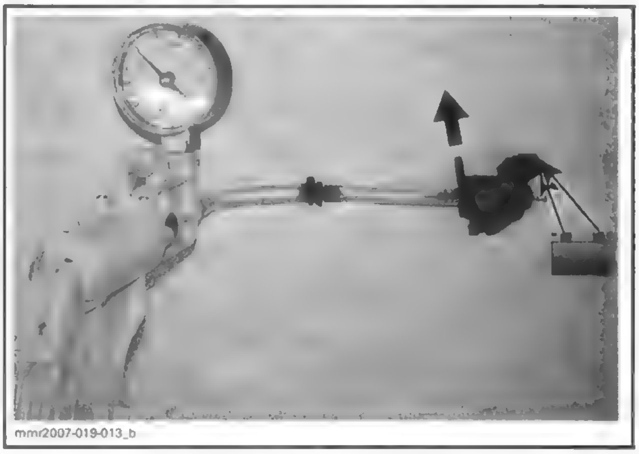
mmr2007-019-013_a

Wait some time to see if pressure drops:

- If pressure does not build up or drops, replace solenoid.
- If pressure is maintained, continue testing.

Supply 12 Vdc to solenoid terminals. Ensure to respect polarity.

Pressure should evacuate through upper nipple.



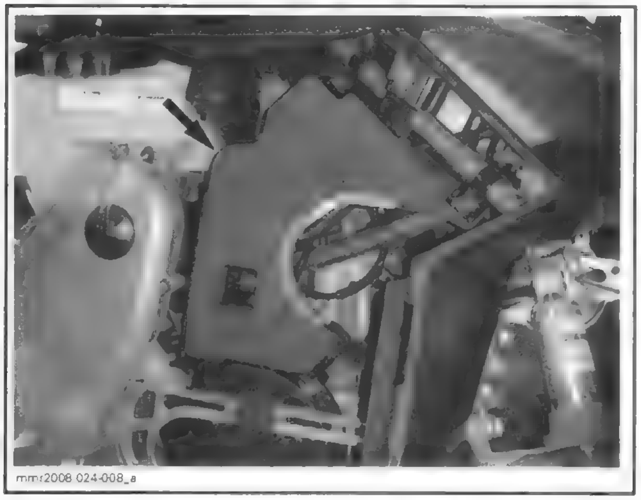
mmr2007-019-013_b

If any test failed, replace solenoid.

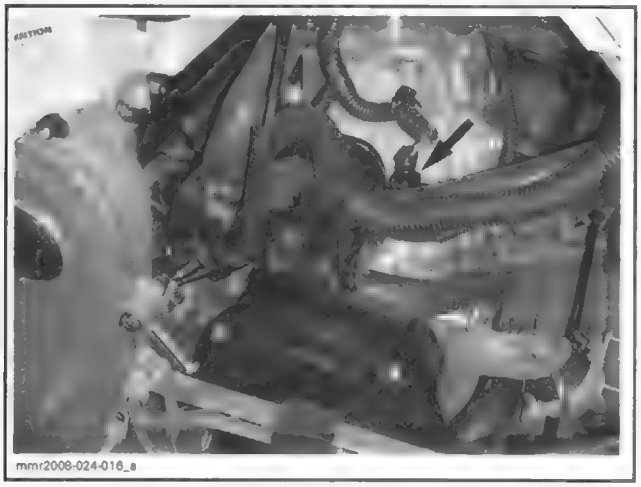
Solenoid Input Voltage Test

Remove muffler. Refer to *EXHAUST SYSTEM.*

Remove the acoustic panel.

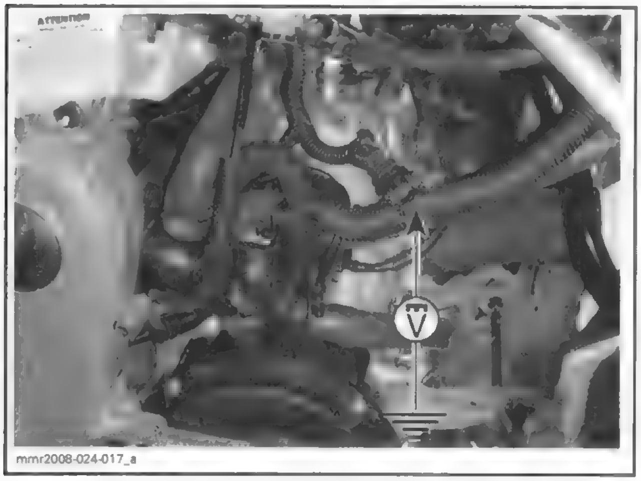


Disconnect the connector from the solenoid.



Measure voltage on connector as follows.

TEST PROBE		MEASUREMENT
Pin 2 (solenoid connector)	Engine ground	Battery voltage



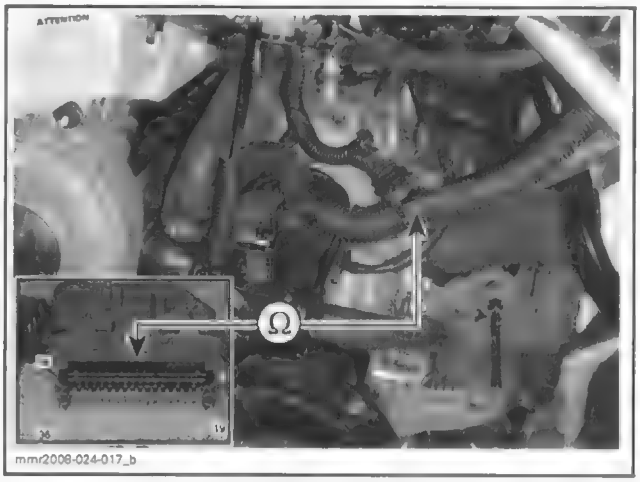
If reading is not as per specification perform the *SOLENOID CIRCUIT TEST.*

Solenoid Circuit Test

Disconnect ECM connector.

Measure wiring resistance as follows.

SOLENOID	SOLENOID CONNECTOR PIN	ECM CONNECTOR PIN	RESISTANCE
VACUUM	1	DA-13	Close to 0 Ω
PRESSURE	1	DA-30	Close to 0 Ω

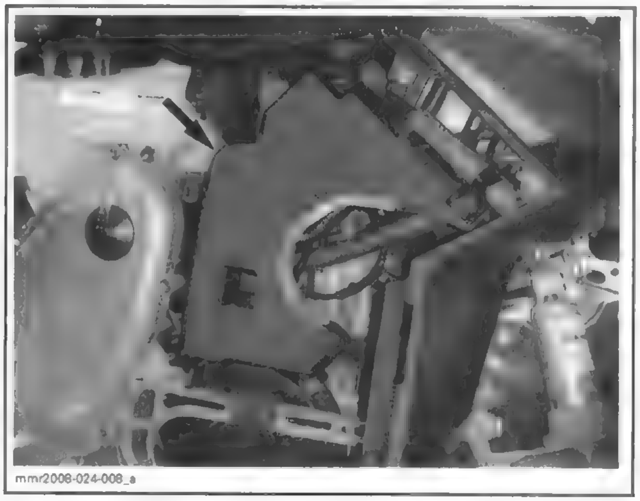


If the solenoid circuit test failed, repair/replace wiring/connectors.

Solenoid Replacement

Remove muffler. Refer to *EXHAUST SYSTEM.*

Remove the acoustic panel.



To replace the RAVE solenoid, do the following:

NOTE: Mark hose locations of RAVE solenoid for reinstallation.

- Disconnect solenoid.
- Remove solenoid screws and solenoid.

For installation, reverse the removal procedure.

CYLINDER HEAD

Cylinder Head Removal

Remove Tool kit support and drive belt guard.

Drain coolant, refer to *COOLING SYSTEM*.

Remove spark plugs.

Remove the knock sensor **no. 19**.

Disconnect the temperature sensor connector.

Unplug coolant hoses from upper coolant socket **no. 20**.

Unplug carburetor heater inlet hose from cylinder head.

Unscrew all cylinder head screws **no. 21**.

Remove the cylinder head **no. 2**.

Cylinder Head Inspection

Check cylinder head **no. 2** for cracks or other damages. Replace if necessary.

Cylinder Head Warpage

NOTE: Refer to *ENGINE MEASUREMENT* for the measurement procedures.

ENGINE	MAXIMUM
797	0.05 mm (.002 in) per 50 mm (2 in) of surface
	0.5 mm (.020 in) for total length of cylinder head

Cylinder Head Cleaning

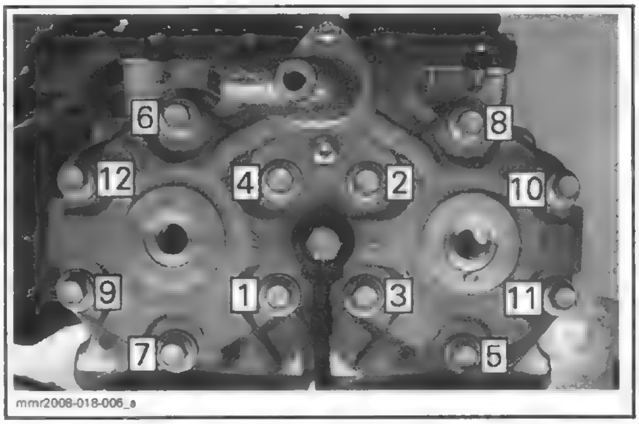
Scrape off carbon formation from cylinder head.

Cylinder Head Installation

Install new rubber ring and round O-rings on each cylinder.

As a first step, torque screws **no. 21** following the illustrated sequence to 15 N•m (133 lbf•**in**).

Then, torque screws **no. 21** following the same sequence to 29 N•m (21 lbf•ft).



NOTE: Reinstall knock sensor. Refer to *ENGINE MANAGEMENT (800R)* section.

CYLINDER BLOCK

Cylinder Block Removal

Remove cylinder head **no. 2** as explained above.

Remove muffler, tune pipe and exhaust manifold, refer to *EXHAUST SYSTEM*.

Remove acoustic panel.

Remove driven pulley and the counter shaft bearing support, refer to *DRIVE SYSTEM/BRAKE*.

Disconnect carburetors from intake adapters and set aside.

Remove the clamp that supports the RAVE valve hose to the intake adapter on MAG side.

Unplug RAVE valve hose from pressure solenoid.

Unscrew cylinder screws **no. 22** and **no. 23** then remove the cylinder block **no. 3**.

Cylinder Block Inspection

Remove RAVE valves, refer to *3D RAVE VALVES REMOVAL* in this section.

Remove reed valves, refer to *REED VALVES REMOVAL* in this section.

Check cylinders for cracks and scoring on the top and bottom of cylinders. Replace if necessary.

NOTE: Refer to *ENGINE MEASUREMENT* for the measurement procedures.

Cylinder Taper

ENGINE	MAXIMUM
797	0.05 mm (.002 in)

Cylinder Out of Round

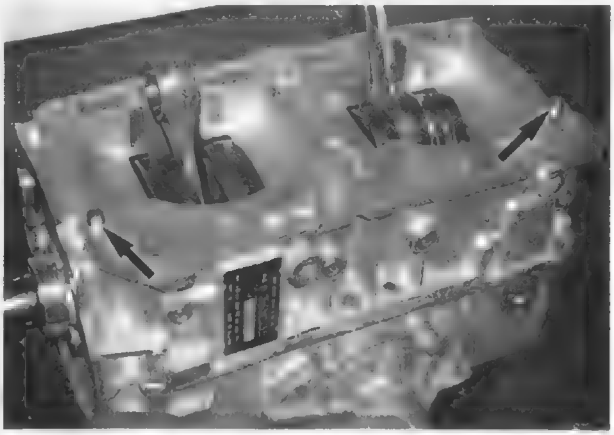
ENGINE	MAXIMUM
797	0.08 mm (.003 in)

Cylinder Block Cleaning

Scrape off carbon formation from exhaust ports.

Cylinder Block Installation

Install dowel pins in crankcase holes.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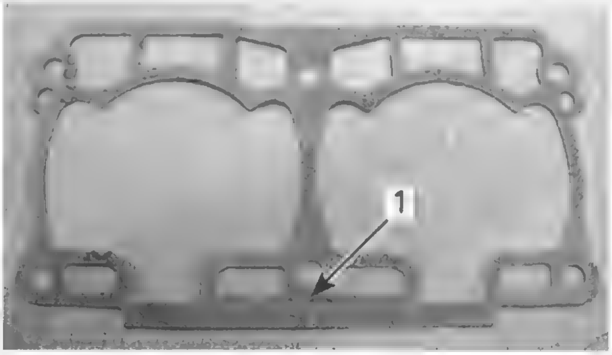
Install a new base gasket of the same thickness as the old one.

Identify gasket thickness by the identification holes on the gasket surface.



mmr2008-018-007_a

TYPICAL
1. Identification holes

NOTE: The general procedure is to install a new gasket of the same thickness. However if you do not know the thickness of the gasket that was on the engine or if a crankcase and/or crankshaft repair was involved, measure the combustion chamber volume to choose the right gasket, refer to *ENGINE MEASUREMENT*.

CAUTION: Always install a gasket of the proper thickness. Failure to do so may cause detonation and severe engine damage.

Install pistons as explained below.

Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

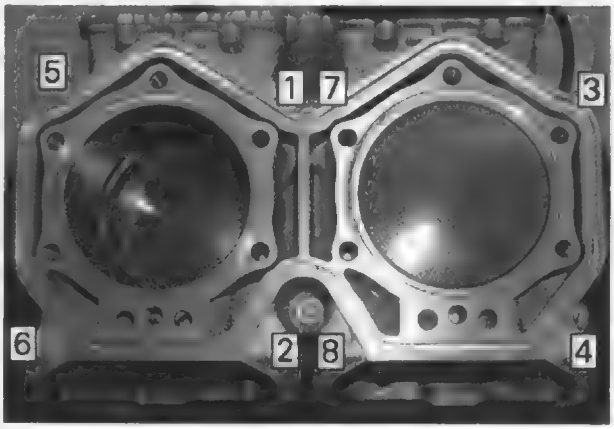
Carefully slide cylinder block down while squeezing piston rings to allow cylinder insertion. Proceed one piston at a time, the help of an assistant may be required. Do not tighten cylinder block yet.

NOTE: Carefully clean screws before reinstallation, specifically under screw head.

As a first step, torque screws **no. 22** following the illustrated sequence to 25 N•m (18 lbf•ft).

Then, torque screws **no. 22** following the same sequence to 50 N•m (37 lbf•ft).

NOTE: When a torquing sequence is done, retorque the middle screws.



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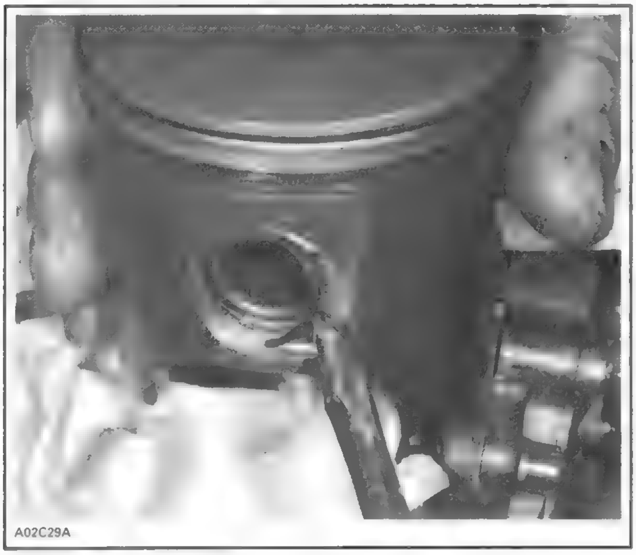
Install all other removed parts.

PISTON

Piston Removal

Remove cylinder block, as explained above.

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase. Then with a pointed tool inserted in piston notch, remove both circlips **no. 25** from piston **no. 26**.



TYPICAL

Push piston pin out of piston.

Remove piston.

Remove bearing.

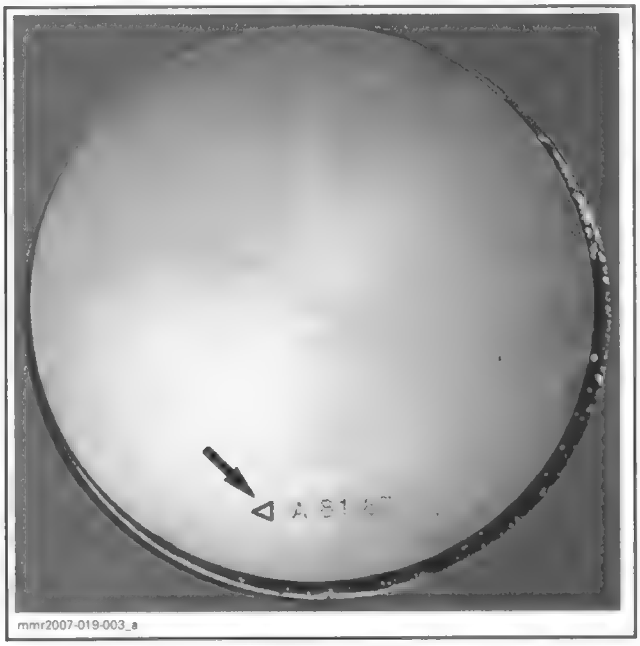
Piston Inspection

For dimension measurement procedures, refer to *ENGINE MEASUREMENT*.

Piston Cleaning

Scrape off carbon formation from piston dome.

NOTE: The arrow on the piston dome must be visible after cleaning.



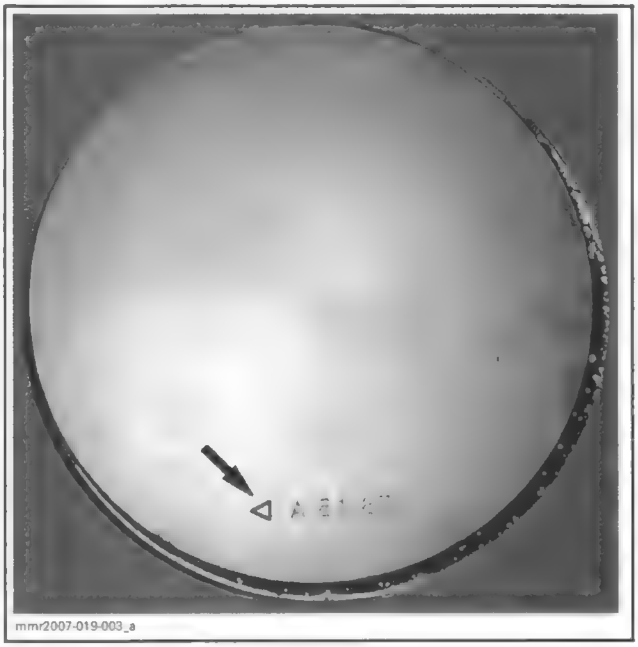
Clean the piston ring groove with a groove cleaner tool or with a piece of broken ring.

Piston Installation

Lubricate needle bearing with injection oil.

Insert bearing into connecting rod.

At assembly, place the pistons over the connecting rods with the arrow on the piston dome facing towards the exhaust port.



EXHAUST DIRECTION INDICATION

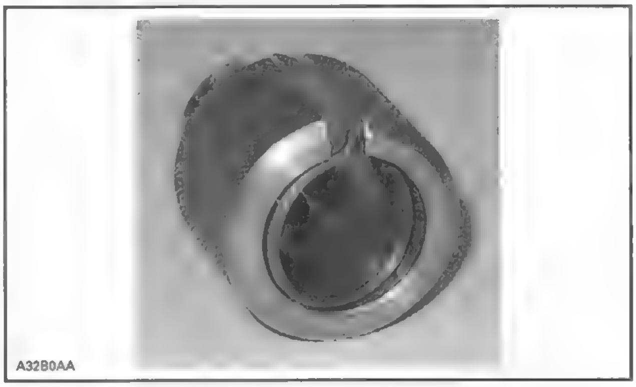
Install piston pin in piston.

CAUTION: Always install new circlips.

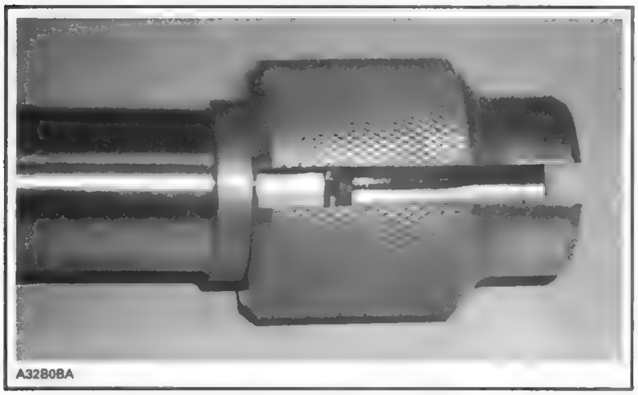
Use appropriate piston circlip installer to install mono-hook circlips **no. 25**.

ENGINE	TOOL
797	Piston circlip installer (P/N 529 035 563)

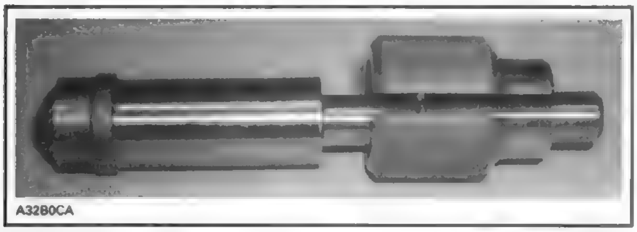
Insert circlip into support so that, when installed in piston groove, the gap will be below the tab (see piston picture below).

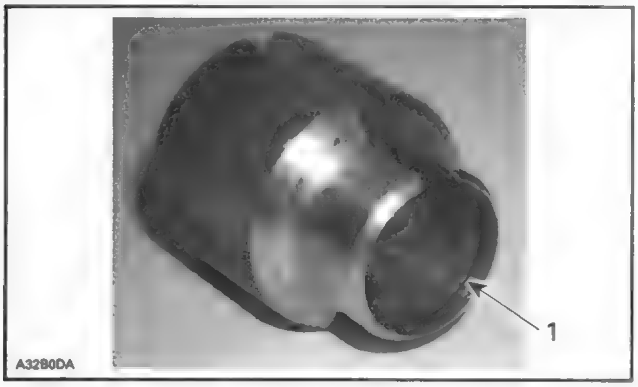


With round end of pusher, position circlip perpendicularly to the support axis.


A32B0BA

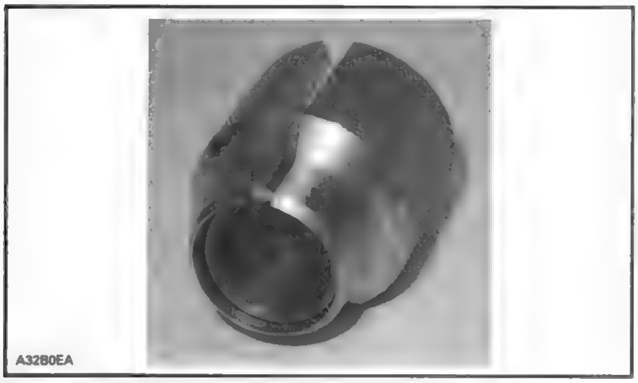
With the other end of the pusher, push circlip into the support groove.


A32B0CA



A32B0DA

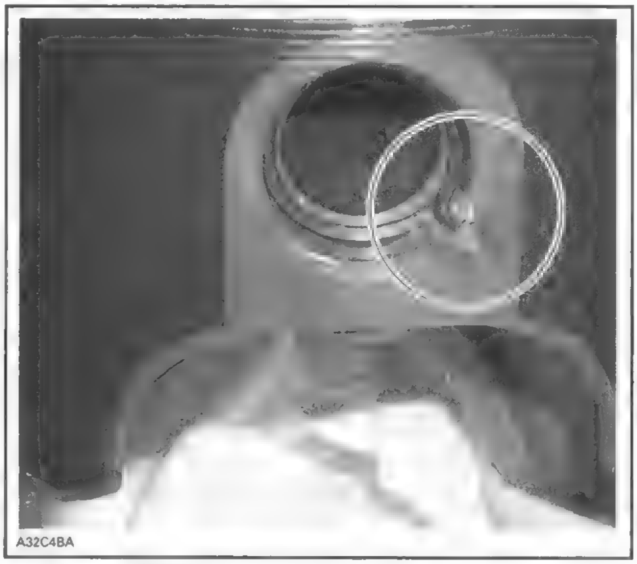
1. Groove


A32B0EA

CIRCLIP READY TO BE INSTALLED ON PISTON

Using a plastic hammer, tap pusher to put the new circlip in place.

NOTE: Make sure to install new circlips with the gap below the tab exactly as shown on the following photo.


A32C4BA

TAB TOWARD TOP

CAUTION: Always install new mono-hook circlips. If circlip installation fails at the first attempt, always retry with a new one.

CAUTION: Circlips must not move freely after installation; if so, replace them.

Install all other removed parts.

BOTTOM END (593)

SERVICE TOOLS

Description	Part Number	Page
bearing installer	259 035 980	149
bearing installer	259 035 990	148
screws	420 840 681	146
crankshaft protector	420 876 552	146
crankshaft protector	420 876 557	146
bearing puller	420 877 635	146
half rings	420 977 479	146
puller ring	420 977 494	146
oil seal pusher	529 035 757	142
oil seal protector	529 035 822	143
Distance gauge	529 035 966	149
Distance gauge	529 035 968	149
bearing heater	529 035 969	147
indicator stick	529 035 970	148
support plate	529 035 976	148
ceramic seal installer	529 036 014	143

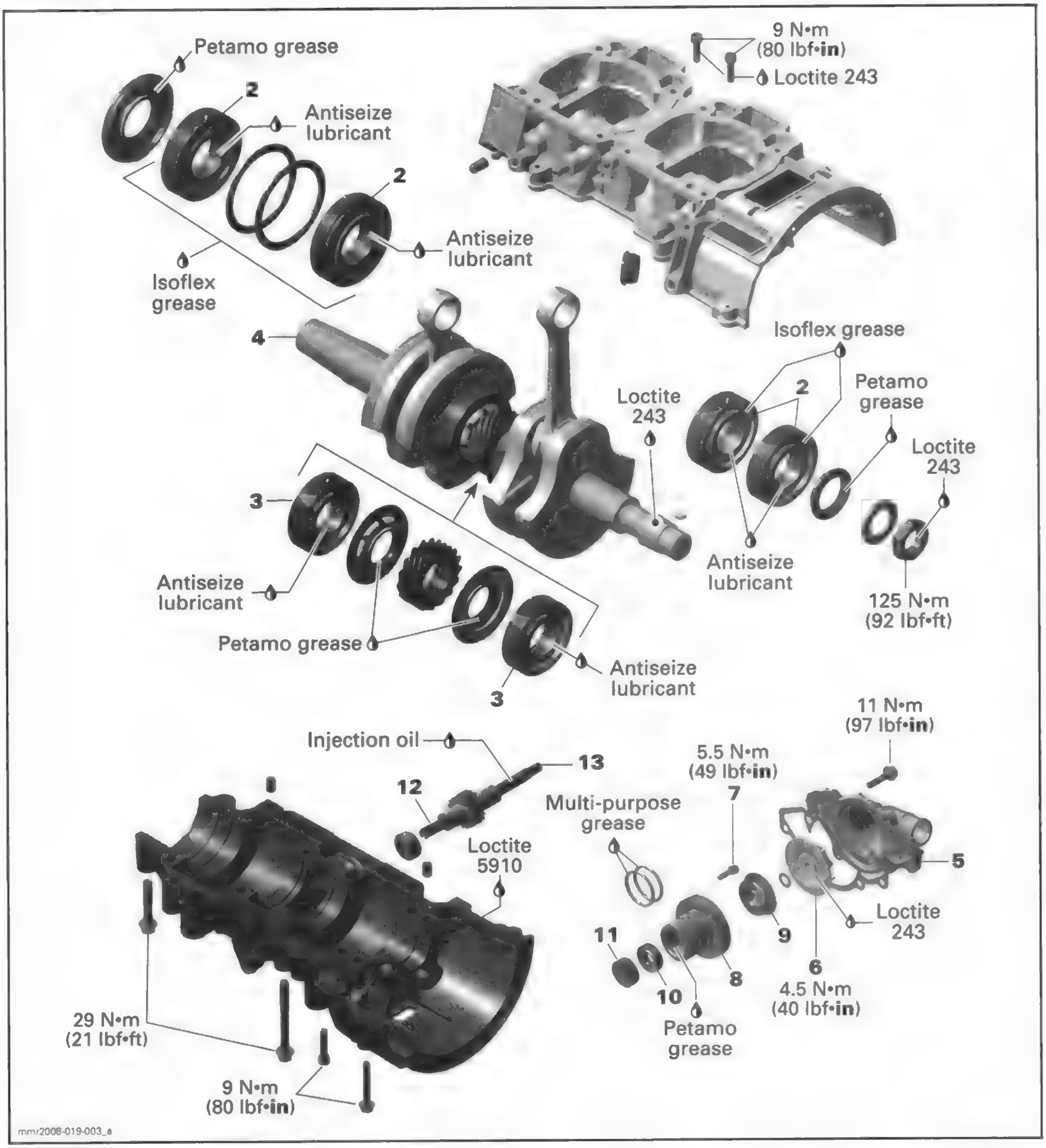
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SPX/OTC bearing separator	1124	147
Snap-on bearing separator	CJ 951	147

SERVICE PRODUCTS

Description	Part Number	Page
Isoflex grease	293 550 021	150
XP-S Lube	293 600 016	146
Loctite 767 (antiseize lubricant)	293 800 070	147
Loctite 5910	293 800 081	144
Loctite Chisel	413 708 500	144
pulley flange cleaner	413 711 809	147

593 Engine


Petamo grease
9 N•m
(80 lbf•**in**)
Loctite 243
2
Antiseize
lubricant
2
Antiseize
lubricant
Isoflex
grease
4
Isoflex grease
2
Petamo
grease
Loctite
243
Loctite
243
3
Antiseize
lubricant
Petamo grease
Antiseize
lubricant
125 N•m
(92 lbf•ft)
Antiseize
lubricant
3
11 N•m
(97 lbf•**in**)
Injection oil
13
12
5.5 N•m
(49 lbf•**in**)
7
Multi-purpose
grease
Loctite
5910
5
Loctite
243
11
9
6
8
10
4.5 N•m
(40 lbf•**in**)
Petamo
grease
29 N•m
(21 lbf•ft)
9 N•m
(80 lbf•**in**)
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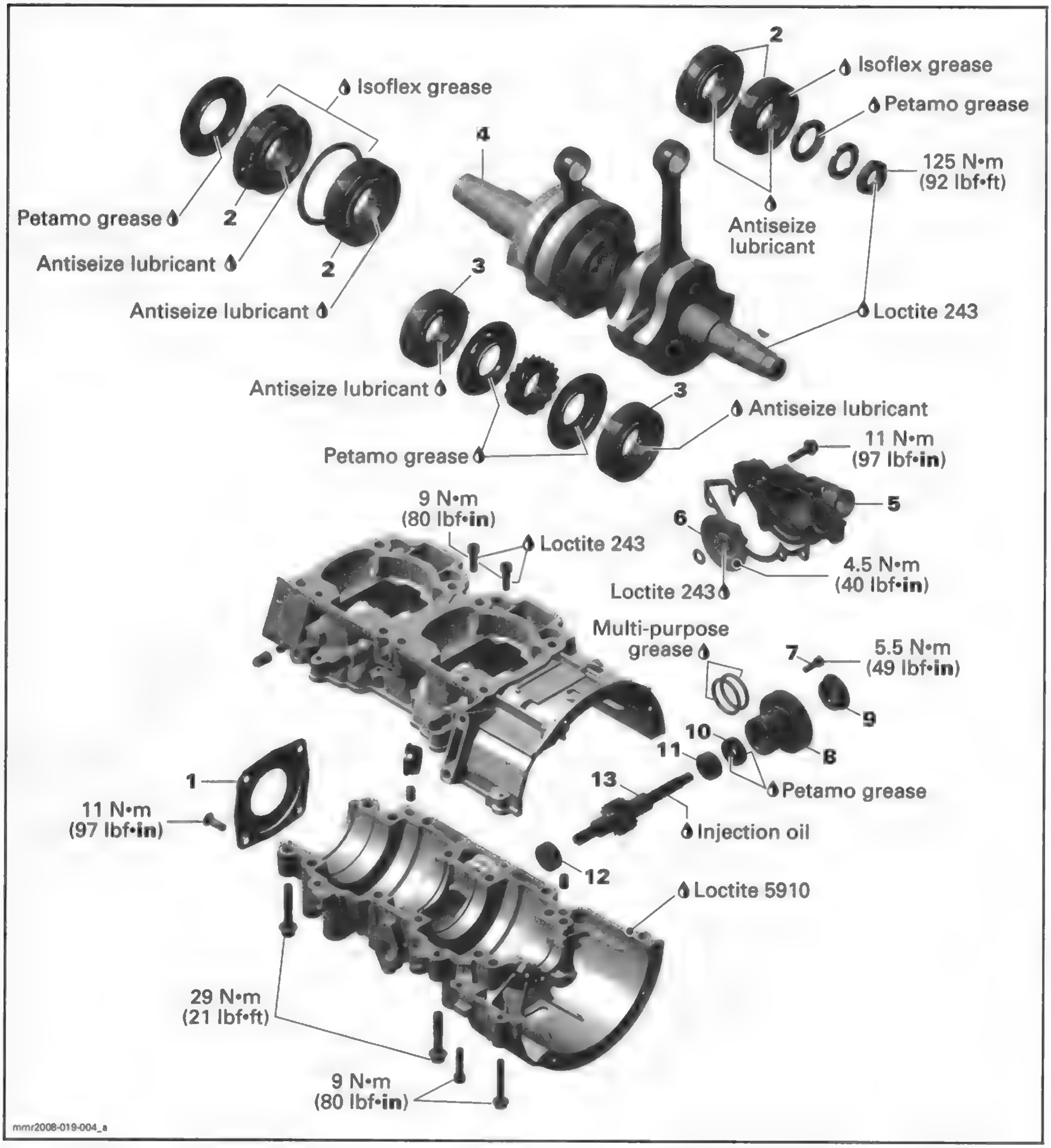
593 HO SDI Engine


2
Isoflex grease
Petamo grease
125 N•m
(92 lbf•ft)
Isoflex grease
4
Petamo grease
2
Antiseize lubricant
2
Antiseize lubricant
Antiseize lubricant
lubricant
Loctite 243
3
Antiseize lubricant
3
Antiseize lubricant
Petamo grease
11 N•m
(97 lbf•in)
9 N•m
(80 lbf•in)
5
6
Loctite 243
4.5 N•m
(40 lbf•in)
Loctite 243
Multi-purpose
grease
7
5.5 N•m
(49 lbf•in)
9
10
11
8
Petamo grease
13
1
11 N•m
(97 lbf•in)
Injection oil
12
Loctite 5910
29 N•m
(21 lbf•ft)
9 N•m
(80 lbf•in)
mmr2008-019-004_a

GENERAL

Before completely disassembling the engine, check airtightness. Refer to *ENGINE LEAK TEST*.

All oil seals and gaskets must be discarded and replaced with new ones when crankcase is split.

CAUTION: After rebuilding an engine always observe a break-in period as described in *OPERATOR'S GUIDE*.

During assembly/installation, use torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.) must be replaced with new ones.

PROCEDURES

WATER PUMP

Water Pump Impeller Removal

Engine In Vehicle

Remove hood, bottom pan cover and RH panel refer to the *BODY* section.

Remove tune pipe and muffler, refer to *EXHAUST SYSTEM*.

Remove acoustic panel.

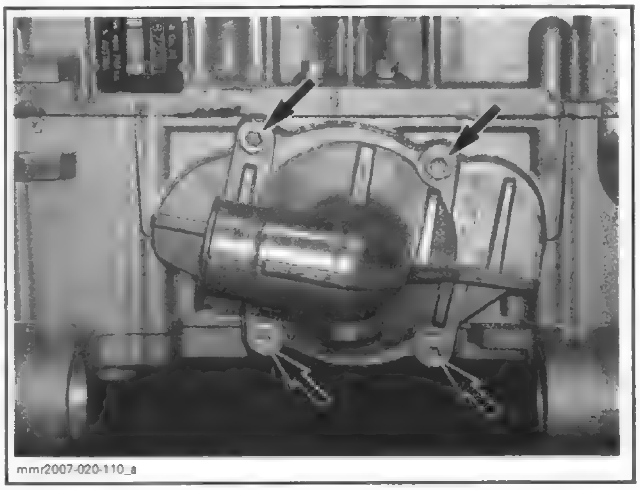
Put a large drain pan under vehicle's bottom pan.

Remove starter, refer to the *STARTING SYSTEM* section.

Refer to *ENGINE OUT OF VEHICLE* to complete procedure.

Engine Out of Vehicle

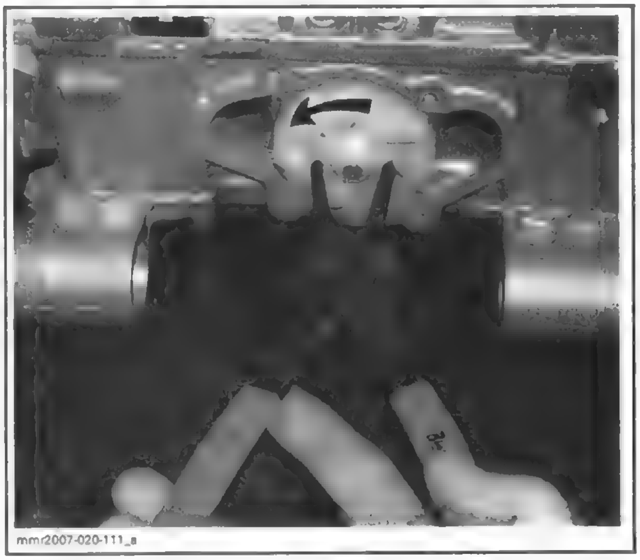
Remove pump housing **no. 5**.



TYPICAL

Remove impeller **no. 6**.

CAUTION: Be careful not to damage impeller fins.



TYPICAL

Clean gasket surfaces of pump housing and crankcase.

Water Pump Impeller Installation

Install a new gasket.

Reverse removal procedure.

Ceramic Seal Replacement

The water/oil pump shaft must be removed to replace the ceramic seal. Refer to *WATER/OIL PUMP SHAFT*.

WATER/OIL PUMP SHAFT

Water/Oil Pump Shaft Removal

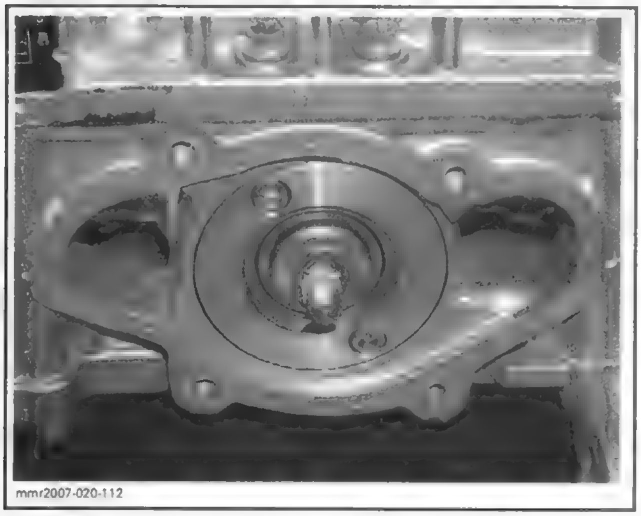
NOTE: It is not necessary to split crankcase to pull out shaft.

Remove engine, refer to *ENGINE REMOVAL AND INSTALLATION* section.

Remove oil injection pump.

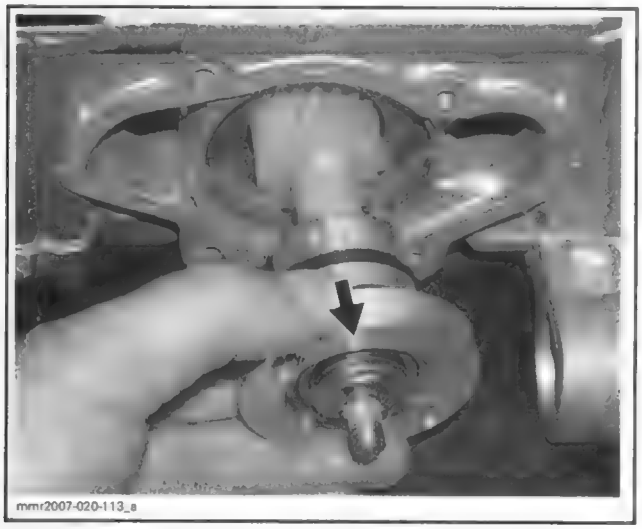
Remove water pump housing and impeller. Refer to *WATER PUMP*.

Remove bearing housing screws **no. 7**.



TYPICAL

From injection oil pump side, push shaft out while turning shaft to release it from worm gear.



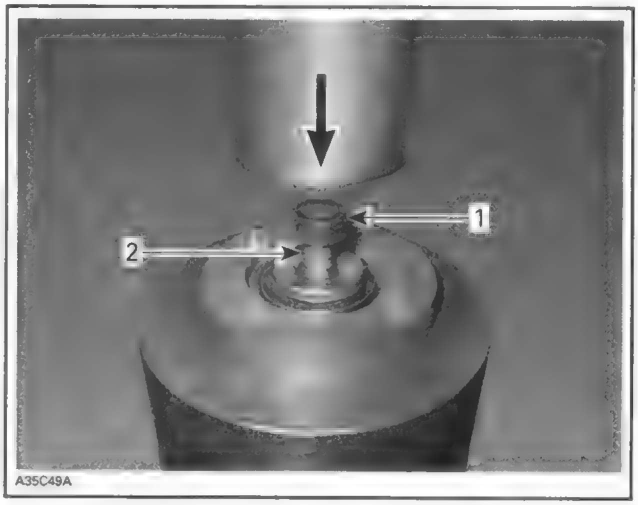
TYPICAL

Water/Oil Pump Shaft Disassembly

CAUTION: Pay attention not to damage the bearing housing no. 8 during disassembly. Marks or other damages will lead to coolant and/or oil leaking.

NOTE: For disassembly/assembly procedure a press is required.

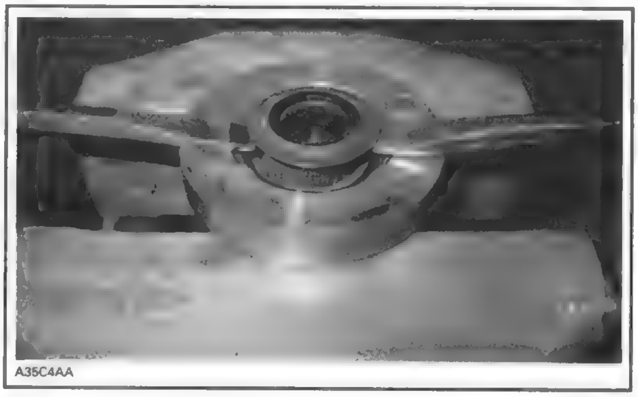
Protect the threads of shaft with a suitable M8 nut. Properly support bearing housing and push shaft out.



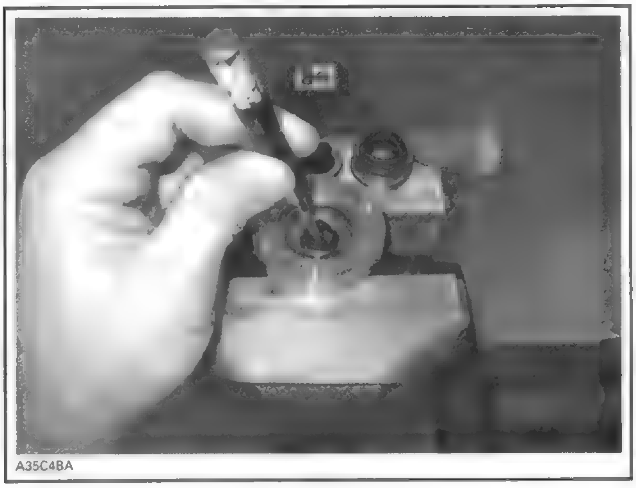
1. *M8 nut*
2. *Shaft*

CAUTION: When removing water/oil pump shaft, always replace ceramic seal no. 9 and oil seal no. 10. Ceramic seal cannot be removed without damage.

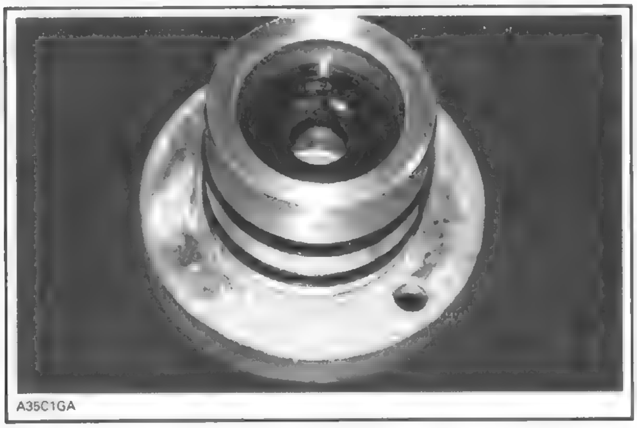
Pry inner part of ceramic seal **no. 9** out.



Extract bearing **no. 11** from the bearing housing using an appropriate pusher.

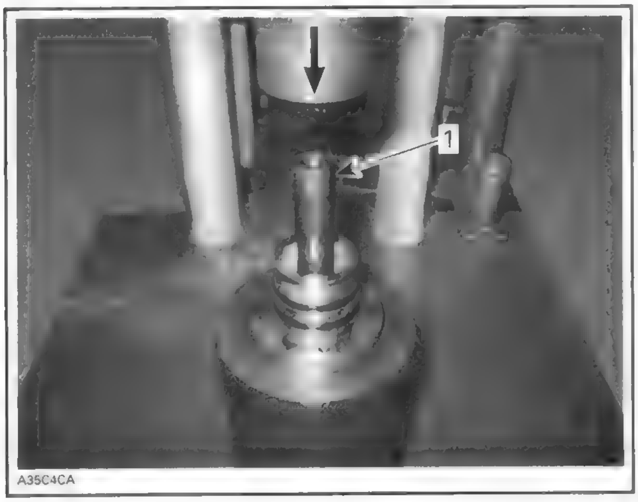


Push oil seal **no. 10** out.

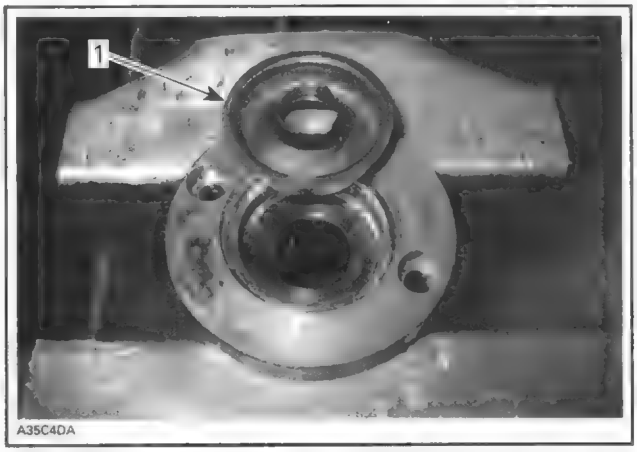


Carefully press the outer part of ceramic seal out.

NOTE: Use a mandrel with diameter of approximately 16 mm (.63 in).

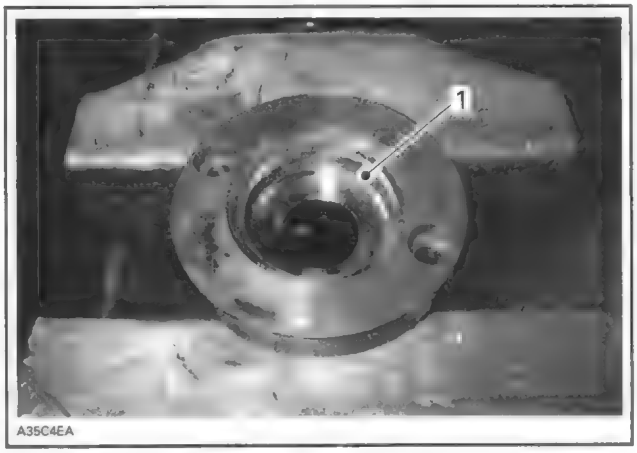


1. 16 mm (.63 in) mandrel



1. Outer part of ceramic seal

Remove sealant from bearing housing with sand paper no. 180.



1. Remove sealant

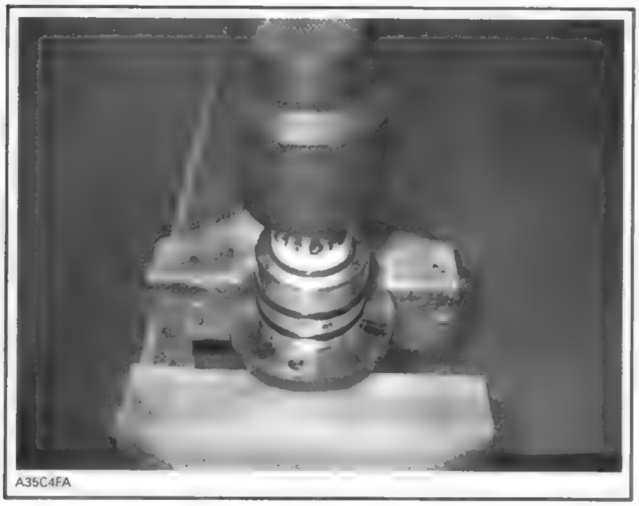
To extract bearing **no. 12** either use a hammer puller or an appropriate pusher.

Water/Oil Pump Shaft Assembly

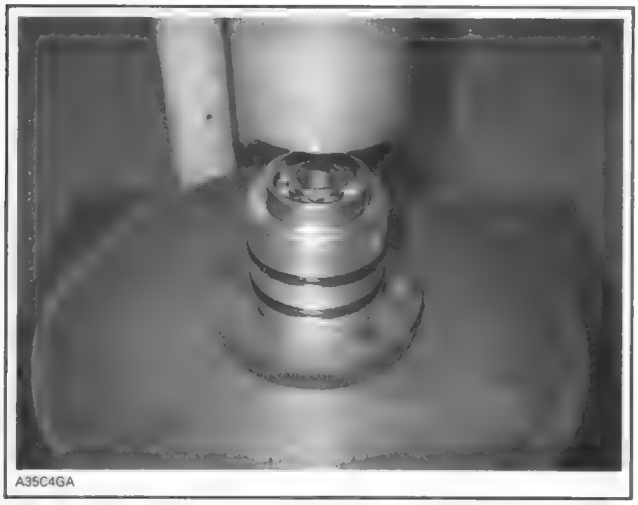
Reverse disassembly procedure and pay attention to the following.

NOTE: Never put oil in the press fit area of the oil seal and ceramic seal.

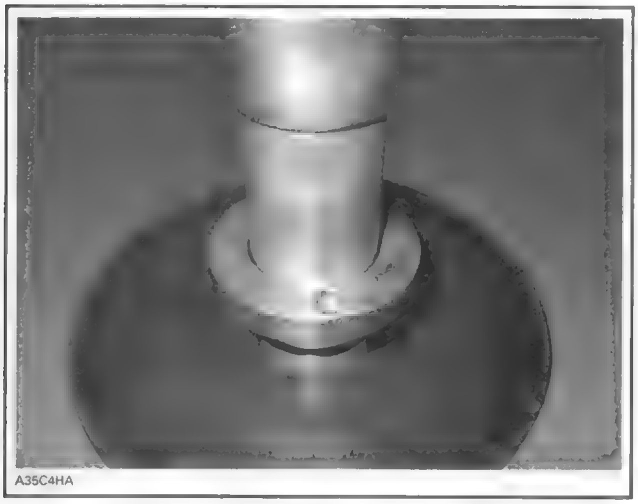
Push the new oil seal **no. 10** in bearing housing using the oil seal pusher (P/N 529 035 757).


A35C4FA

Press bearing **no. 11** into bearing housing **no. 8**.

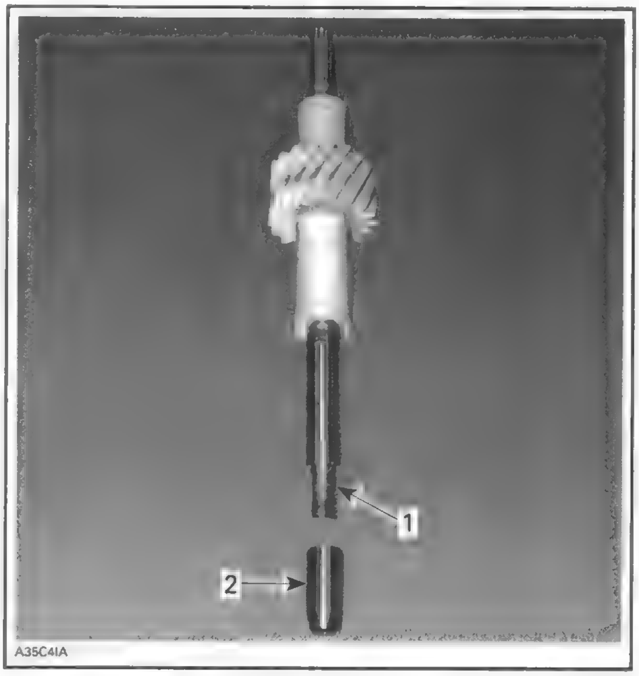

A35C4GA

Push the new ceramic seal **no. 9** in bearing housing **no. 8** using the ceramic seal installer (P/N 529 036 014).


A35C4HA

CAUTION: Never use a hammer for the ceramic seal installation. Only use a press to avoid damaging the ceramic component.

Put oil seal protector (P/N 529 035 822) on water/oil pump shaft **no. 13**.



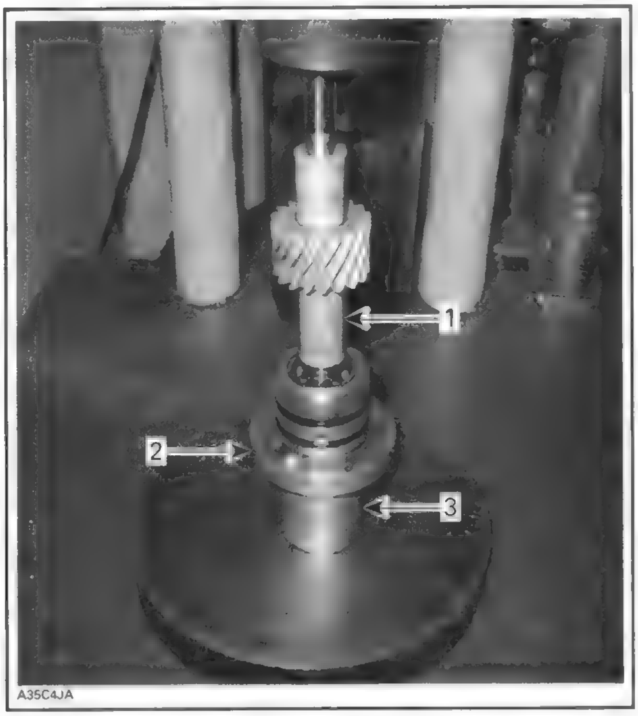
A35C4IA

1. *Water/oil pump shaft*
2. *Oil seal protector*

Press water/oil pump shaft **no. 13** into the bearing housing **no. 8** with appropriate force.

CAUTION: Inadequate force will damage the oil seal no. 10 and bearing no. 11.

NOTE: During installation support the ceramic seal using the ceramic seal installer (P/N 529 036 014) as shown on the following illustration.



1. *Water/oil pump shaft*
2. *Bearing housing*
3. *Ceramic seal installer*

Remove oil seal protector from water/oil pump shaft.

Water/Oil Pump Shaft Installation

Clean gasket surfaces of pump housing and crankcase.

Pour 50 mL (2 U.S. oz) of injection oil in the cavity under worm gear to lubricate pump gearing.

Install water/oil pump shaft assembly in crankcase half while turning shaft to mesh gears.

Torque bearing housing screws **no. 7**.

After impeller installation, ensure shaft turns properly.

Install a new pump housing gasket.

Torque water pump housing screws in a criss-cross sequence.

Reinstall oil injection pump.

CRANKCASE

Crankcase Disassembly

Remove engine, refer to *ENGINE REMOVAL AND INSTALLATION*.

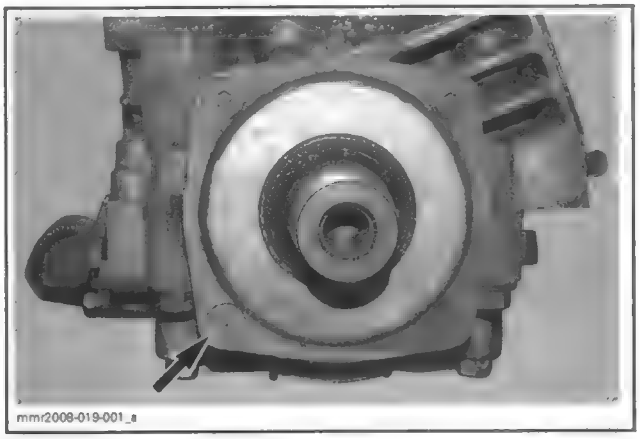
Remove cylinder head and cylinders. Refer to *TOP END (593)*.

Remove rewind starter. Refer to *REWIND STARTER*.

Remove trigger coils, magneto flywheel and stator. Refer to *MAGNETO SYSTEM*.

Remove front engine supports.

Remove PTO oil seal cover **no. 1**.



TYPICAL

Remove all screws that retain both housing together.

Split crankcase and remove crankshaft.

Clean all metal components in a non-ferrous metal cleaner. Use Loctite Chisel (P/N 413 708 500) accordingly.

CAUTION: Never use a sharp object to scrape away old sealant as score marks incurred are harmful to crankcase sealing.

Crankcase Inspection

Check crankcase for cracks or other damages. Replace if necessary.

Crankcase Assembly

Install crankshaft in lower crankcase. See *CRANKSHAFT* for procedure.

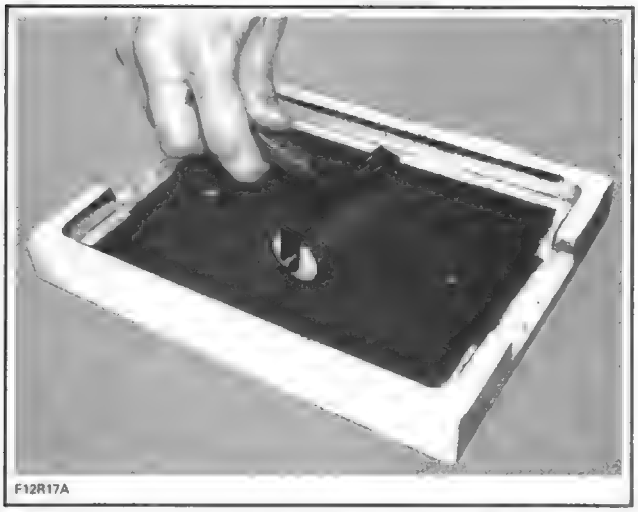
Apply Loctite 5910 (P/N 293 800 081) on crankcase halves. Proceed as follows.

IMPORTANT: The total assembly sequence, including sealing compound application and crankcase torquing, must be performed within 10 minutes.

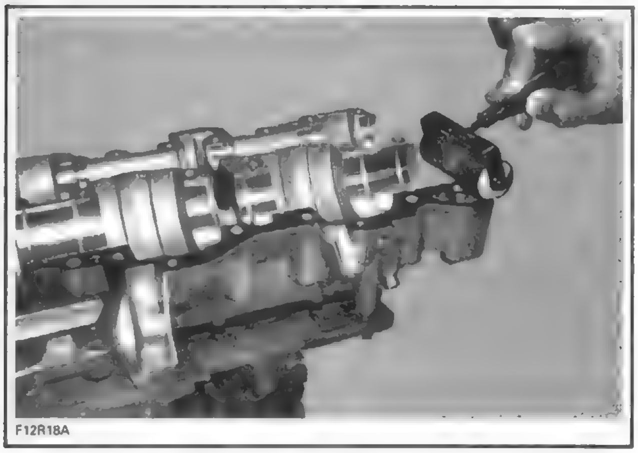
Use a plexiglass plate and apply some sealant on it. Use a 50 - 75 mm (2 - 3 in) soft rubber roller and spread the sealant to get a thin uniform coat on the plate (spread as necessary).

When ready, apply the sealant on crankcase mating surfaces.

NOTE: If you do not use the roller method, you may use your finger to uniformly distribute the sealant.



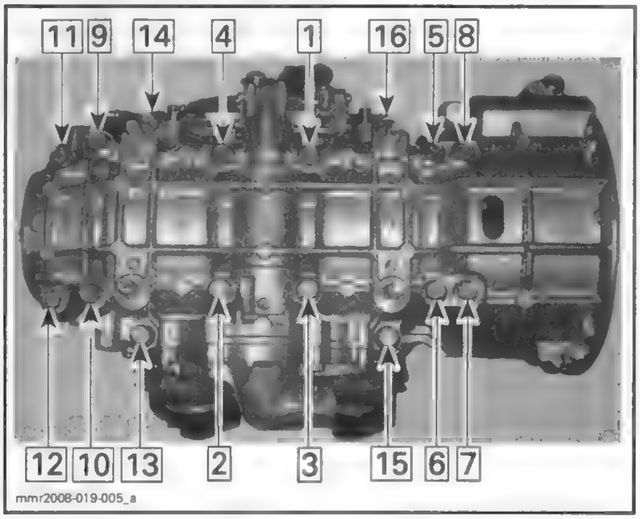
F12R17A



F12R18A

Assemble both crankcase halves.

As a first step, torque screws to 18 N•m (159 lbf•**in**) as per following illustrated sequence.



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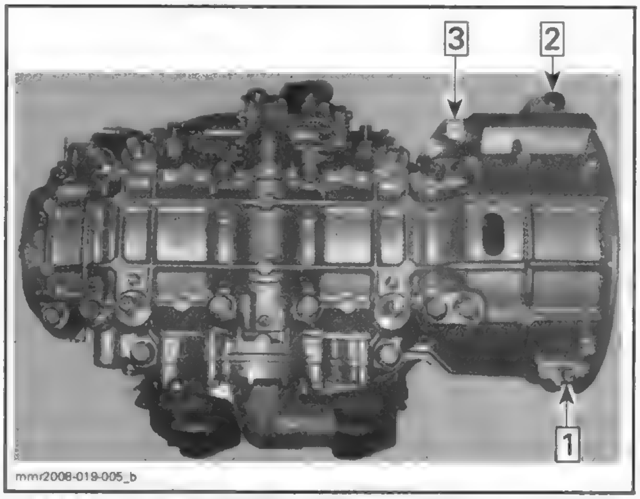
Repeat torquing sequence and this time torque screws to 29 N•m (21 lbf ft).

Finish by torquing the following crankcase screws to 9 N•m (80 lbf•**in**).



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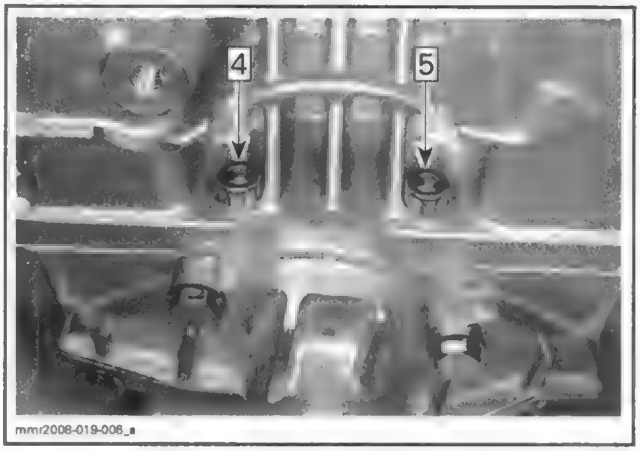

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Install PTO oil seal cover (593 HO SDI engine).

CRANKSHAFT

Crankshaft Removal

To remove crankshaft, use crankcase disassembly procedure.

Crankshaft Inspection

Check crankshaft bearings. They must turn smoothly and without noise. Replace as required.

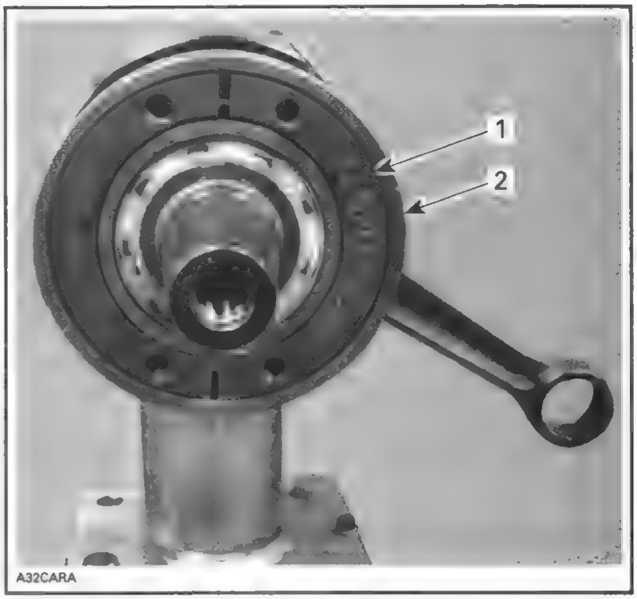
Refer to table below to find crankshaft dimension specifications. For dimension measurement procedures, refer to *ENGINE MEASUREMENT*.

ENGINE MEASUREMENT	TOLERANCES		
	NEW PARTS (min.)	(max.)	WEAR LIMIT
Crankshaft deflection on PTO side	N.A.	0.06 mm (.0024 in)	N.A.
Crankshaft deflection on MAG side	N.A.	0.05 mm (.002 in)	N.A.
Crankshaft deflection in center of crankshaft	N.A.	0.08 mm (.0031 in)	N.A.
Connecting rod big end axial play	593 ENGINE		
	0.39 mm (.015 in)	0.74 mm (.029 in)	1.20 mm (.047 in)
	593 HO SDI ENGINE		
	0.31 mm (.012 in)	0.6801 mm (.0268 in)	1.20 mm (.047 in)
Crankshaft end-play	0.10 mm (.004 in)	0.30 mm (.0118 in)	N.A.

Crankshaft Bearing Removal

NOTE: Normally it takes approximately 10 minutes to heat up a bearing so in the event of replacing bearing, it's recommended to start the bearing heating process prior to removal operation. See procedure further.

To remove bearings **no. 2** and **no. 3** from crankshaft **no. 4**, install half rings (P/N 420 977 479) and puller ring (P/N 420 977 494) on the outer bearing.

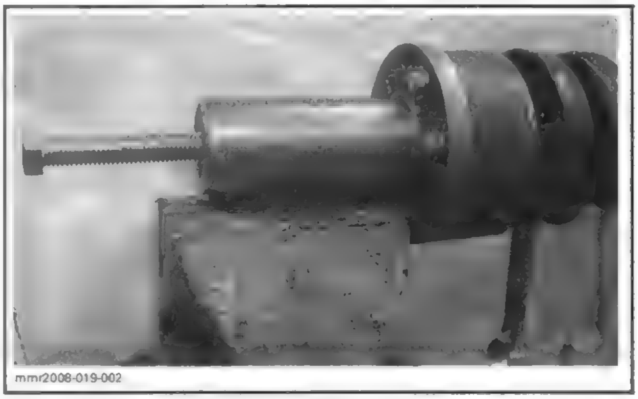


1. Half ring
2. Puller ring

NOTE: Apply grease on crankshaft end in order to hold in place the crankshaft protector (P/N 420 876 552) on PTO side and crankshaft protector (P/N 420 876 557) on MAG side.

Using screws (P/N 420 840 681), install bearing puller (P/N 420 877 635) on the half rings.

Secure the bearing puller in a vise by one of its rib.



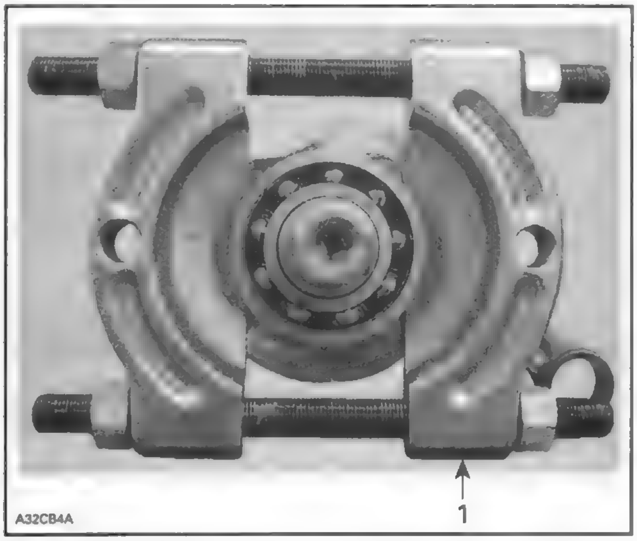
BEARING PULLER SECURED IN THE VISE

CAUTION: Never use any air impact tool for tightening the puller bolt. Lubricate the bolt with XP-S Lube (P/N 293 600 016) to avoid damaging the threads.

Screw in the puller bolt until the bearing comes out.

Follow the same procedure for the inner bearing.

NOTE: In the case of damaged bearing or less clearance between crankshaft counterbalance and the bearing or on the MAG side bearing, use Snap-on bearing separator (P/N CJ 951) or SPX/OTC bearing separator (P/N 1124) to facilitate the removal.

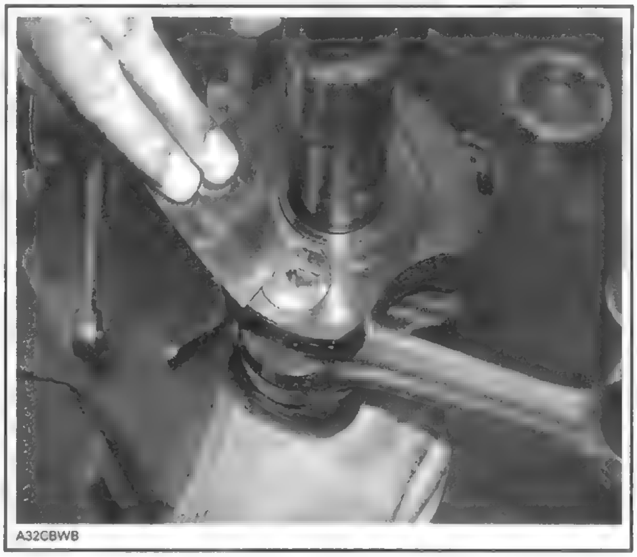


1. Bearing separator

Crankshaft Bearing Installation

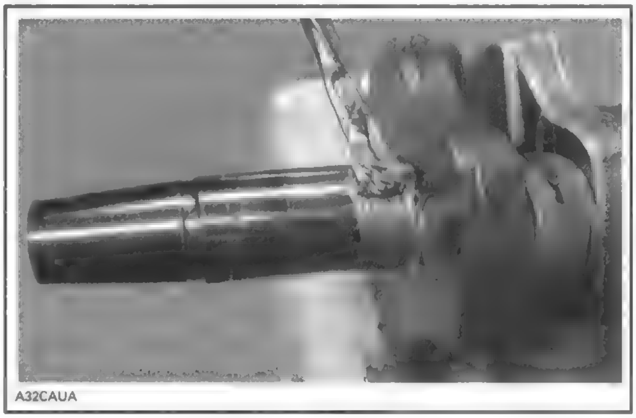
Inspect crankshaft ends for damage.

Clean crankshaft ends with sand paper no. 180 to remove possible seal marks and debris.

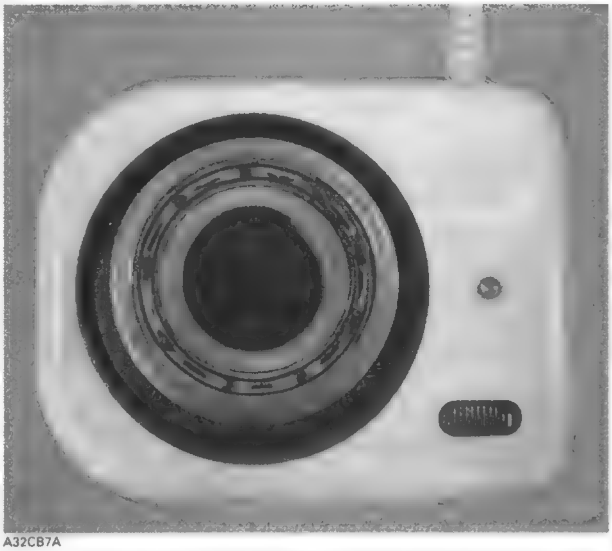


Remove all residue using pulley flange cleaner (P/N 413 711 809).

Smear Loctite 767 (antiseize lubricant) (P/N 293 800 070) on part of crankshaft where bearing fits.



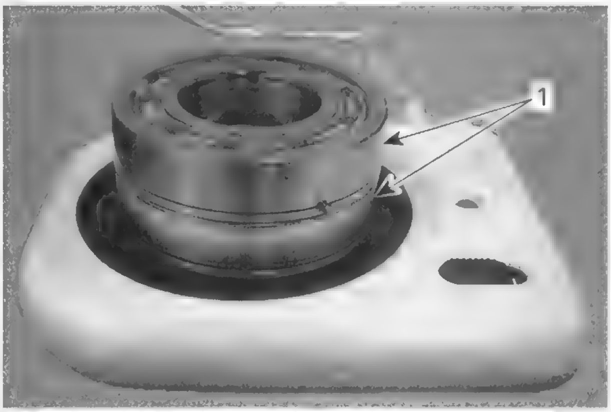
Heat up the bearing(s) using bearing heater (P/N 529 035 969). This will expand bearings and ease installation. If required, put a suitable plate or shim to avoid the direct contact between integrated seal with the heating surface.


A32CB7A

CAUTION: Bearing(s) should not be heated to more than 80°C (176°F). Do not heat bearing(s) on direct flame, or with a heat gun or in an oil bath. Inappropriate bearing(s) heating may result in inner seals or cage failure.

For even heat distribution, turn bearing several times during heating process.

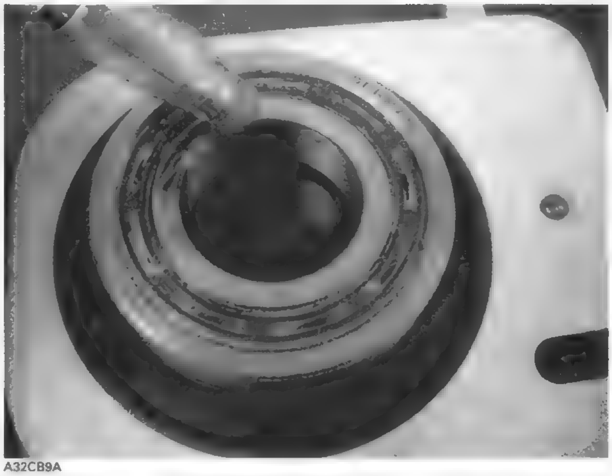
NOTE: Two bearings can be heated at the same time on one bearing heater.



A32CB8A

1. Bearings

Probe the inner race of the bearing with the temperature indicator stick (P/N 529 035 970). Stick will liquefy when the bearing reach the proper temperature.


A32CB9A

⚠ WARNING

Do not touch heated bearing with bare hands. Always wear heat resisting gloves before handling the heated bearing(s).

CAUTION: Never reinstall a bearing that has been removed.

Slide in the inner PTO bearing with the integrated seal facing crankshaft. Push bearing to end position.

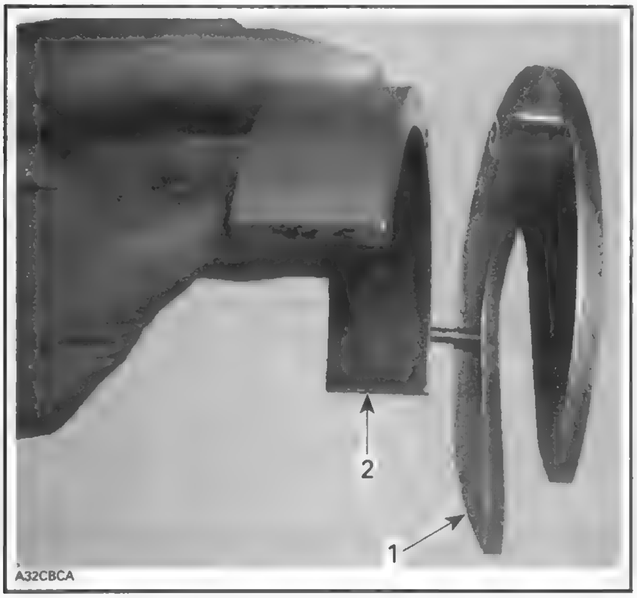
A32CAVA

NOTE: Heated bearing should slide easily onto the crankshaft. If required, push with a bearing installer (P/N 259 035 990) on the inner ring of the bearing. **Pay special attention to correct positioning of the drive pins and/or retaining discs.**

Install retaining discs.

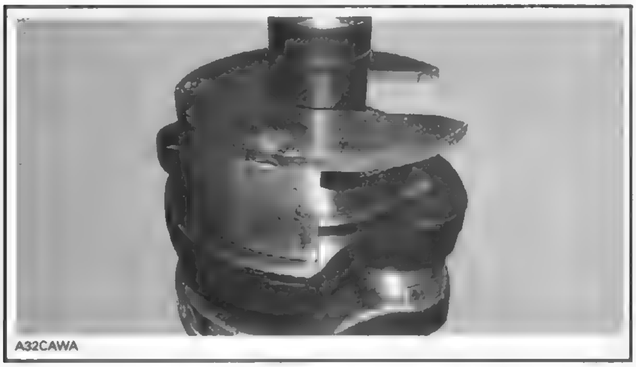
Install support plate (P/N 529 035 976) with appropriate distance gauge; refer to following table.

TOOL	ENGINE
Distance gauge (P/N 529 035 966)	593
Distance gauge (P/N 529 035 968)	593 HO SDI



1. Support plate
2. Distance gauge

Install bearing locator tool.



Slide the heated outer PTO bearing onto the crankshaft until it contacts the distance gauge.

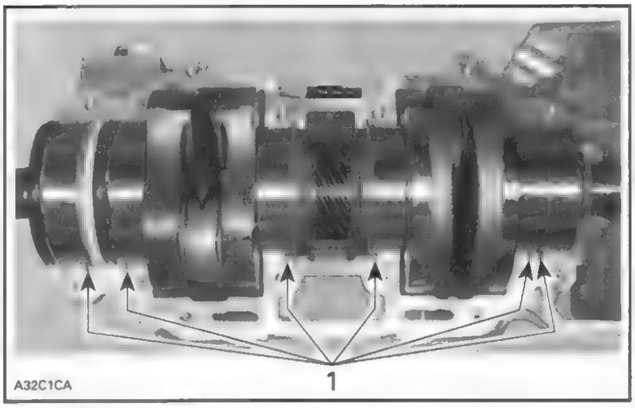
Slide the first MAG bearing **with the integrated seal facing crankshaft** until it bottoms on crankshaft shoulder.

NOTE: Heated bearing should slide easily onto the crankshaft. If required, push with a bearing installer (P/N 259 035 980) on the inner ring of the bearing.

Slide-in the second bearing until it contacts the first one.

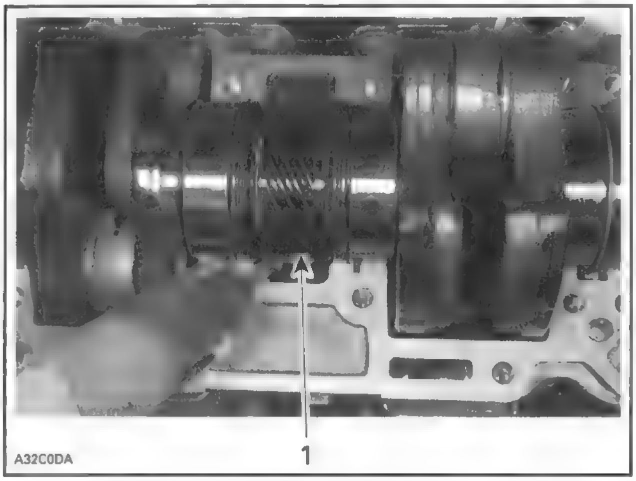
Crankshaft Installation

At crankshaft installation, position drive pins as illustrated.



TYPICAL
1. *Position pins*

Pour 50 mL (2 U.S. oz) of injection oil in the pan under central gear to lubricate pump gearing as per photo.



1. *Oil bath*

Apply Isoflex grease (P/N 293 550 021) as per following procedure:

CAUTION: Use only the recommended grease. Make sure not to push grease between outside bearing race and half crankcase.

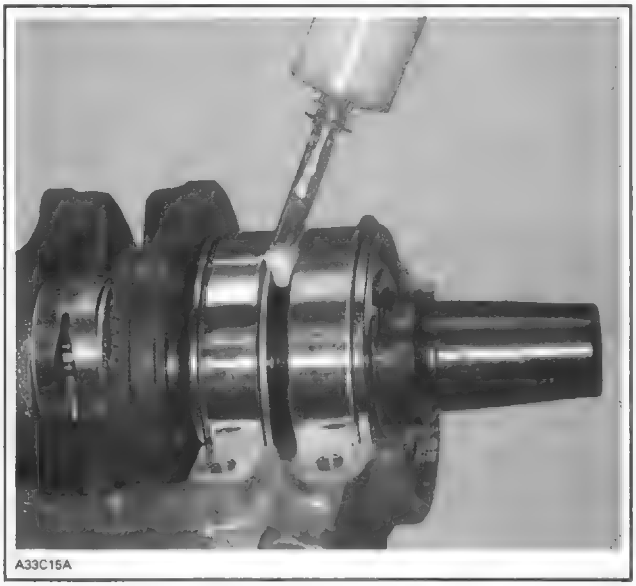
Put the following quantity of grease in a syringe.

ENGINE	QUANTITY OF GREASE
593	42 ± 5 mL
593 HO SDI	30 ± 5 mL

NOTE: The 50 g tube corresponds to 50 mL of grease.

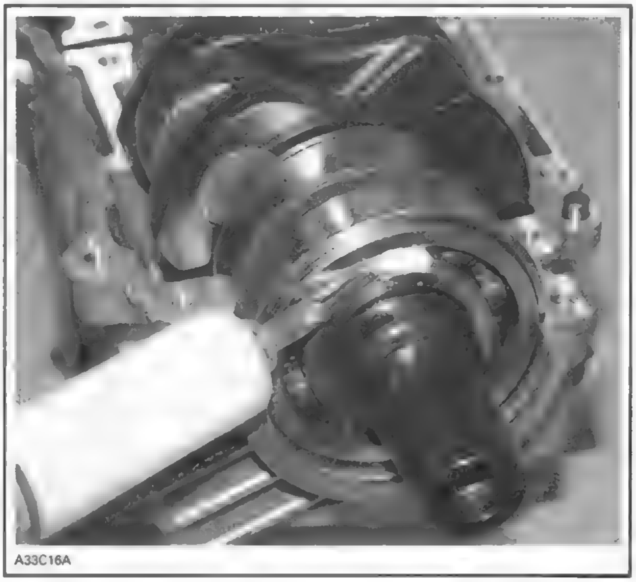
CAUTION: **Do not exceed the recommended amount of grease.**

Fill inner side of PTO side bearing with grease (about 10 mL).

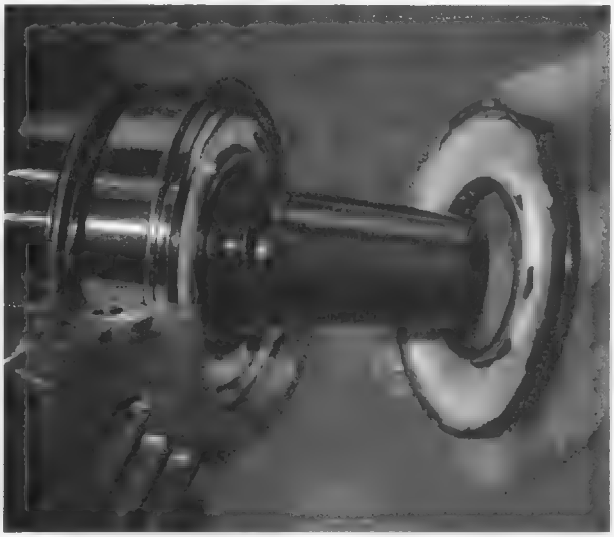


PTO SIDE BEARING FILLED WITH GREASE

With the syringe, fill the outer ball bearing and inner side of outer seal with the remaining of grease.



BALLS COATED WITH A SEAM OF GREASE


A33C17A

TYPICAL — FILL WITH GREASE AND SET IN PLACE

Apply 6 mL of grease to MAG side outer bearing.

NOTE: If replaced with new bearing, do not apply grease as new bearings come with grease already applied.

BOTTOM END (797)

SERVICE TOOLS

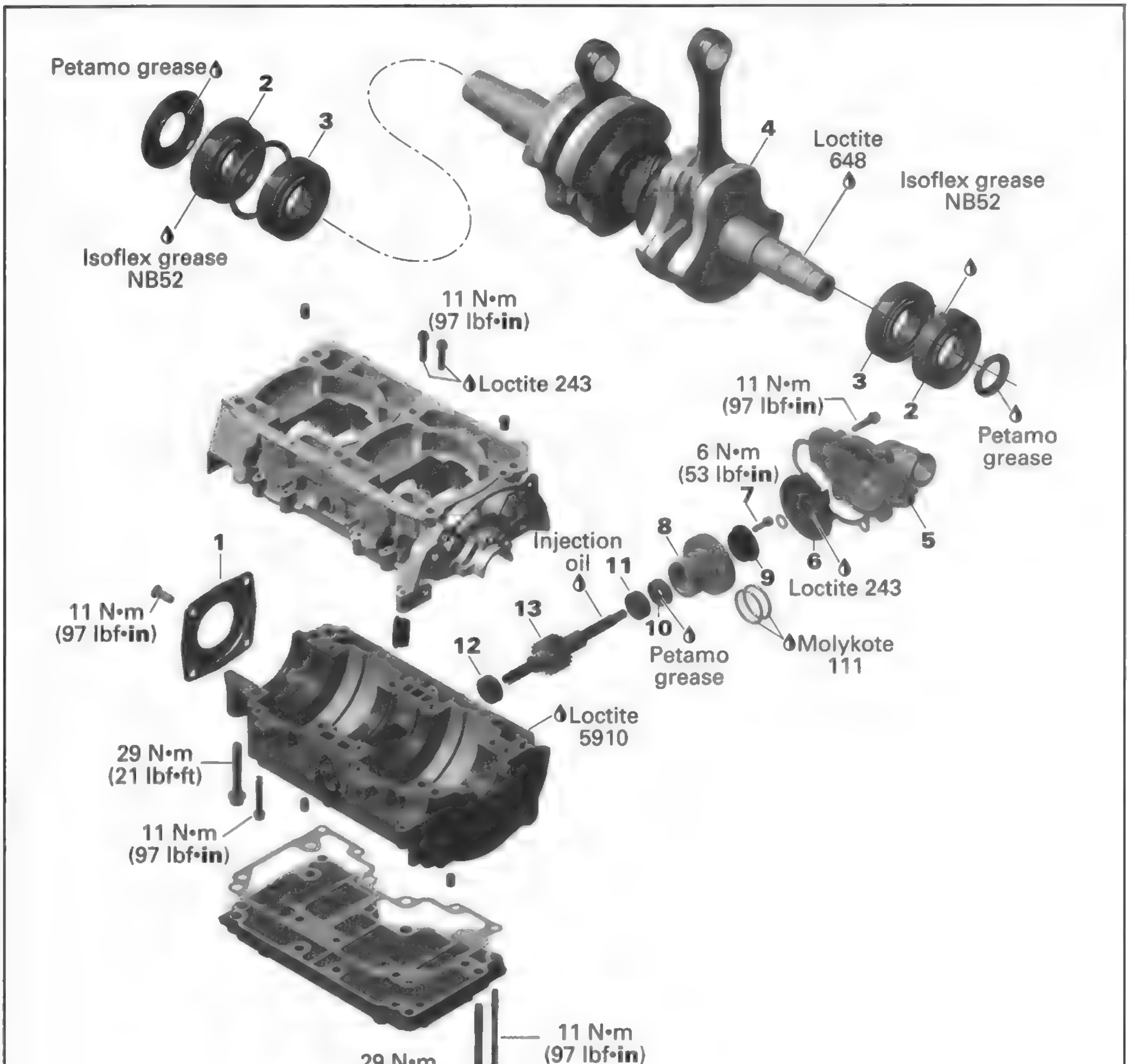
Description	Part Number	Page
screws	420 840 681	163
oil seal pusher	529 035 757	157
oil seal protector	529 035 822	158
bearing heater	529 035 969	164
indicator stick	529 035 970	164
bearing puller	529 036 004	163
ceramic seal installer	529 036 014	158
distance gauge	529 036 060	165

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SPX/OTC bearing separator	1124	163
Snap-on bearing separator	CJ 951	163

SERVICE PRODUCTS

Description	Part Number	Page
Isoflex grease	293 550 021	167
XP-S Lube	293 600 016	163
Loctite 767 (antiseize lubricant)	293 800 070	164
Loctite 5910	293 800 081	160
Loctite Chisel	413 708 500	160
pulley flange cleaner	413 711 809	164


Petamo grease
2
3
Isoflex grease NB52
4
Loctite 648
Isoflex grease NB52
11 N•m (97 lbf•**in**)
Loctite 243
3
2
Petamo grease
11 N•m (97 lbf•**in**)
6 N•m (53 lbf•**in**)
7
5
8
Injection oil
11
9
6
Loctite 243
1
11 N•m (97 lbf•**in**)
13
10
Petamo grease
Molykote 111
12
Loctite 5910
29 N•m (21 lbf•ft)
11 N•m (97 lbf•**in**)
11 N•m (97 lbf•**in**)
29 N•m (21 lbf•ft)

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GENERAL

Before completely disassembling the engine, check airtightness. Refer to *LEAK TEST.*

All oil seals and gaskets must be discarded and replaced with new ones when crankcase is split.

CAUTION: After rebuilding an engine always observe a break-in period as described in *OPERATOR'S GUIDE.*

During assembly/installation, use torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.) must be replaced with new ones.

PROCEDURES

WATER PUMP

Water Pump Impeller Removal

Engine In Vehicle

Remove Hood, bottom pan cover and RH panel refer to the *BODY* section.

Remove tune pipe and muffler, refer to *EXHAUST SYSTEM.*

Remove acoustic panel.

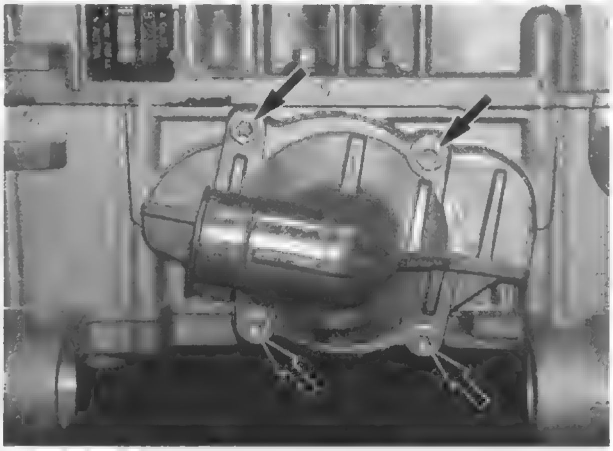
Put a large drain pan under vehicle's bottom pan.

Remove starter, refer to the *STARTING SYSTEM* section.

Refer to *ENGINE OUT OF VEHICLE* to complete procedure.

Engine Out of Vehicle

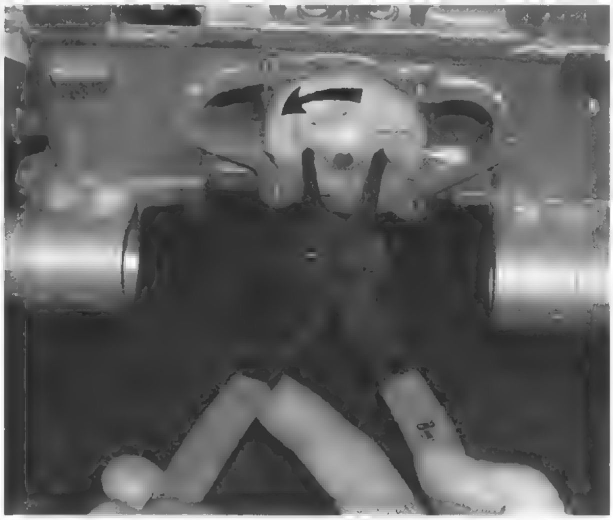
Remove pump housing **no. 5**.



TYPICAL

Remove impeller **no. 6**.

CAUTION: Be careful not to damage impeller fins.



TYPICAL

Clean gasket surfaces of pump housing and crankcase.

Water Pump Impeller Installation

Install a new gasket.

Reverse removal procedure.

Ceramic Seal Replacement

The water/oil pump shaft must be removed to replace the ceramic seal. Refer to *WATER/OIL PUMP SHAFT.*

WATER/OIL PUMP SHAFT

Water/Oil Pump Shaft Removal

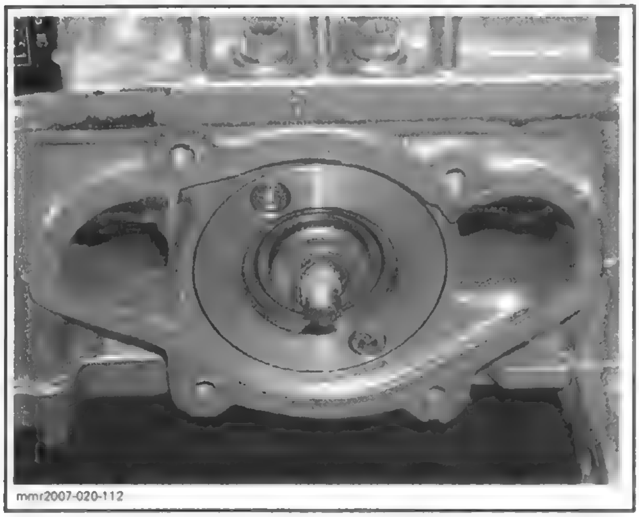
NOTE: It is not necessary to split crankcase to pull out shaft.

Remove engine, refer to *ENGINE REMOVAL AND INSTALLATION* section.

Remove oil injection pump.

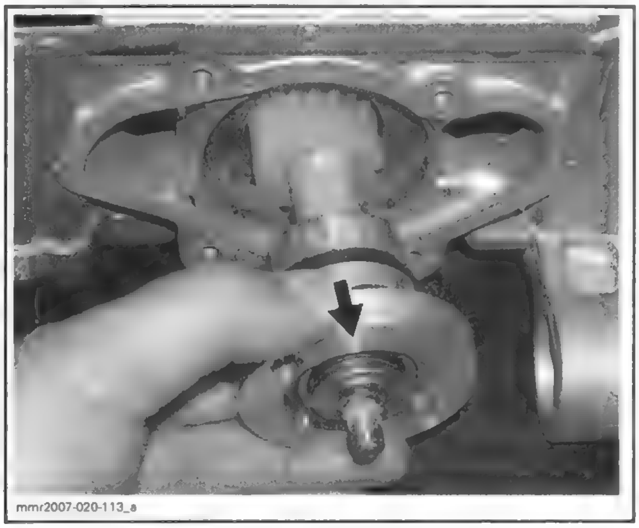
Remove water pump housing and impeller. Refer to *WATER PUMP*.

Remove bearing housing screws **no. 7**.



TYPICAL

From injection oil pump side, push shaft out while turning shaft to release it from worm gear.



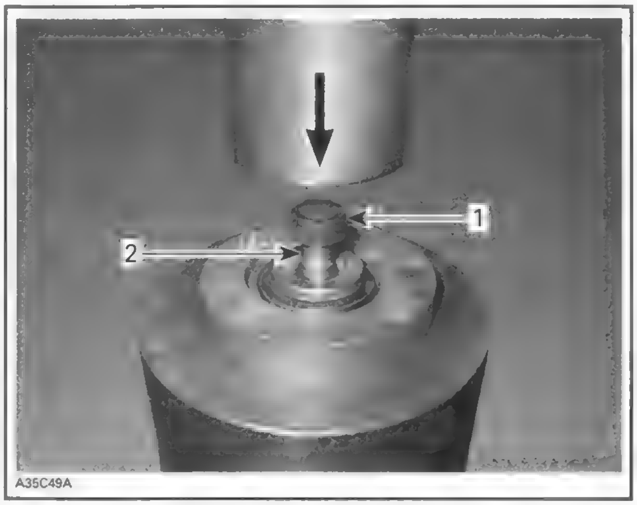
TYPICAL

Water/Oil Pump Shaft Disassembly

CAUTION: Pay attention not to damage the bearing housing no. 8 during disassembly. Marks or other damages will lead to coolant and/or oil leaking.

NOTE: For disassembly/assembly procedure a press is required.

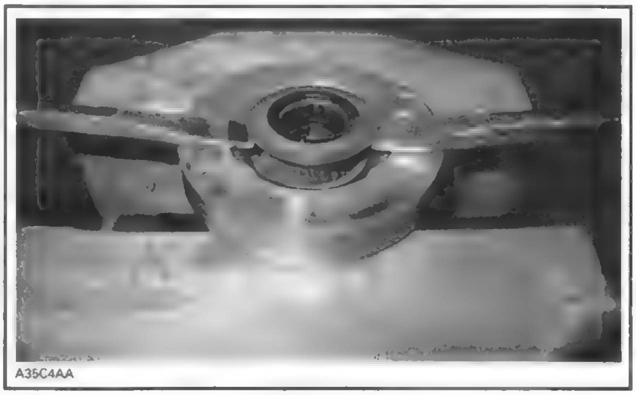
Protect the threads of shaft with a suitable M8 nut. Properly support bearing housing and push shaft out.



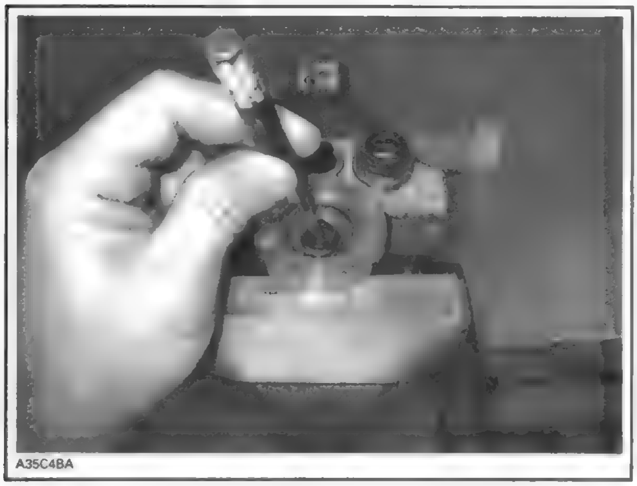
1. *M8 nut*
2. *Shaft*

CAUTION: When removing water/oil pump shaft, always replace ceramic seal no. 9 and oil seal no. 10. Ceramic seal cannot be removed without damage.

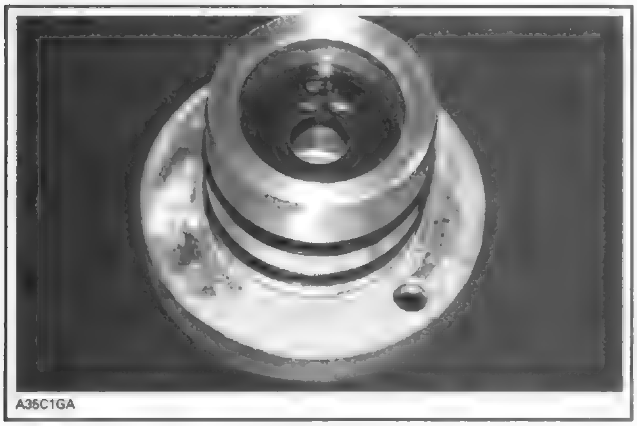
Pry inner part of ceramic seal **no. 9** out.



Extract bearing **no. 11** from the bearing housing using an appropriate pusher.

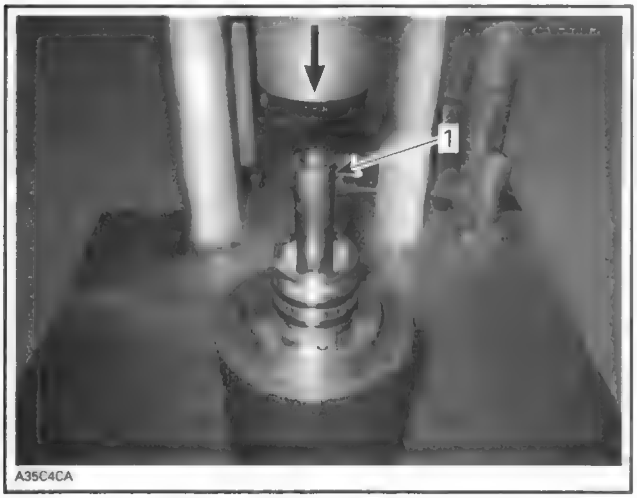


Push oil seal **no. 10** out.

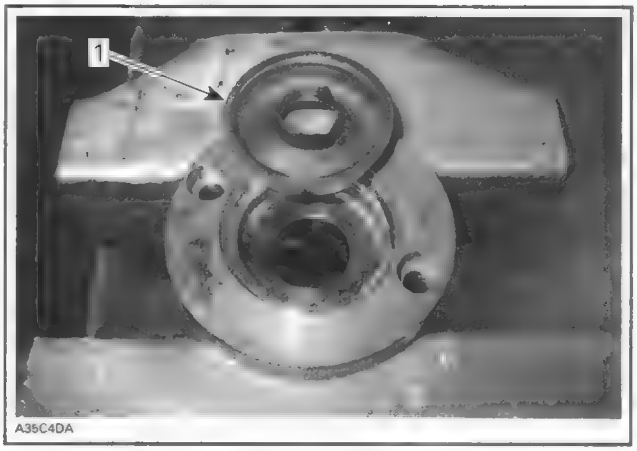


Carefully press the outer part of ceramic seal out.

NOTE: Use a mandrel with diameter of approximately 16 mm (.63 in).

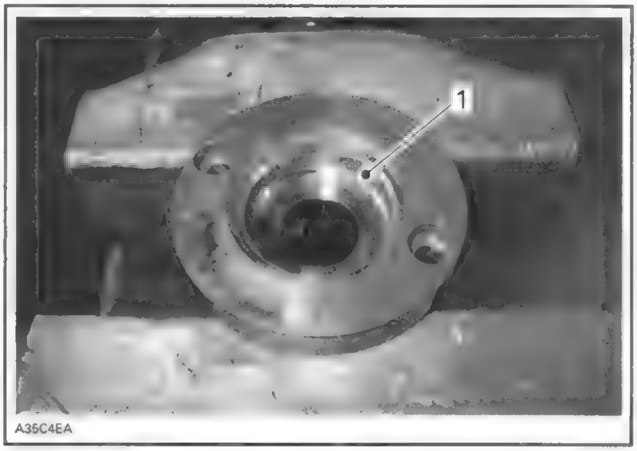


1. 16 mm (.63 in) mandrel



1. Outer part of ceramic seal

Remove sealant from bearing housing with sand paper no. 180.



1. Remove sealant

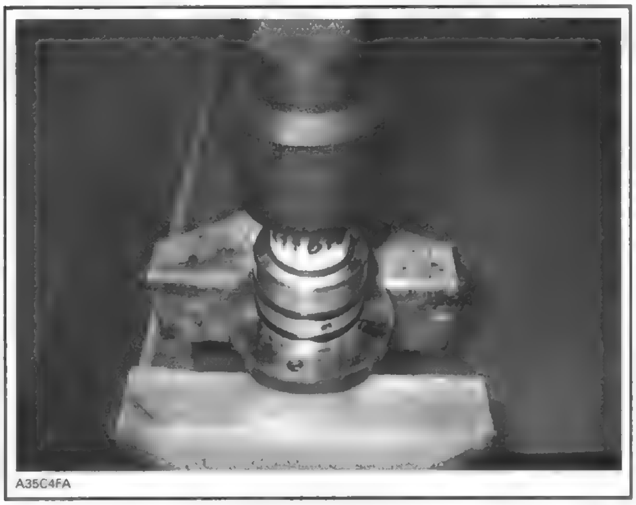
To extract bearing **no. 12** either use a hammer puller or an appropriate pusher.

Water/Oil Pump Shaft Assembly

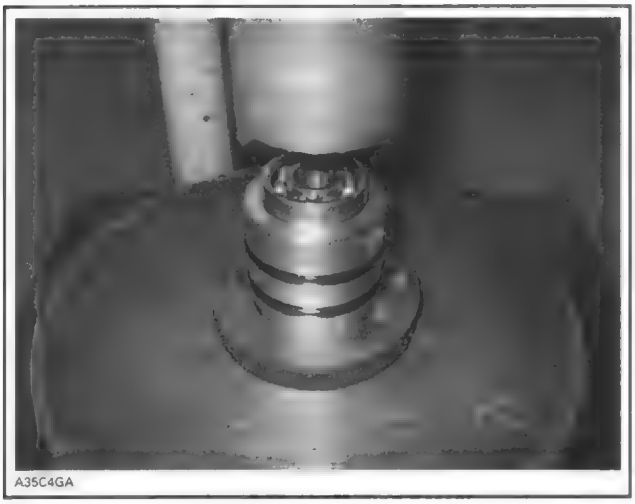
Reverse disassembly procedure and pay attention to the following.

NOTE: Never put oil in the press fit area of the oil seal and ceramic seal.

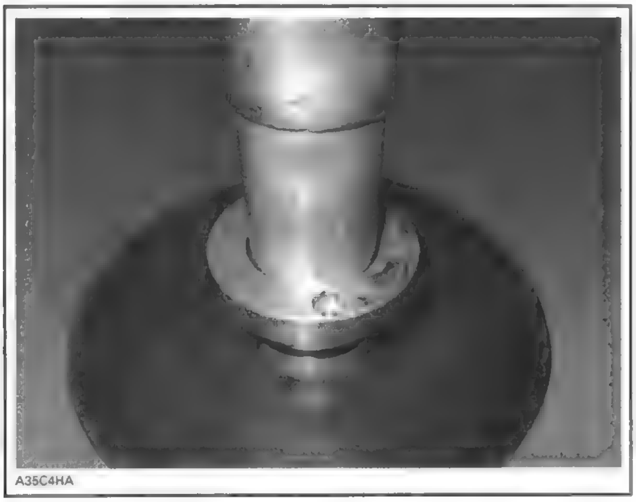
Push the new oil seal **no. 10** in bearing housing using the oil seal pusher (P/N 529 035 757).



Press bearing **no. 11** into bearing housing **no. 8**.

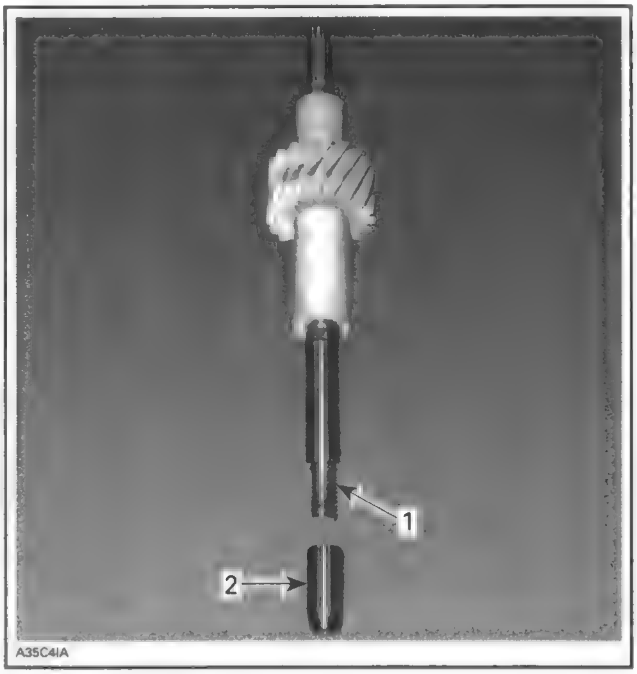


Push the new ceramic seal **no. 9** in bearing housing **no. 8** using the ceramic seal installer (P/N 529 036 014).



CAUTION: Never use a hammer for the ceramic seal installation. Only use a press to avoid damaging the ceramic component.

Put oil seal protector (P/N 529 035 822) on water/oil pump shaft **no. 13**.

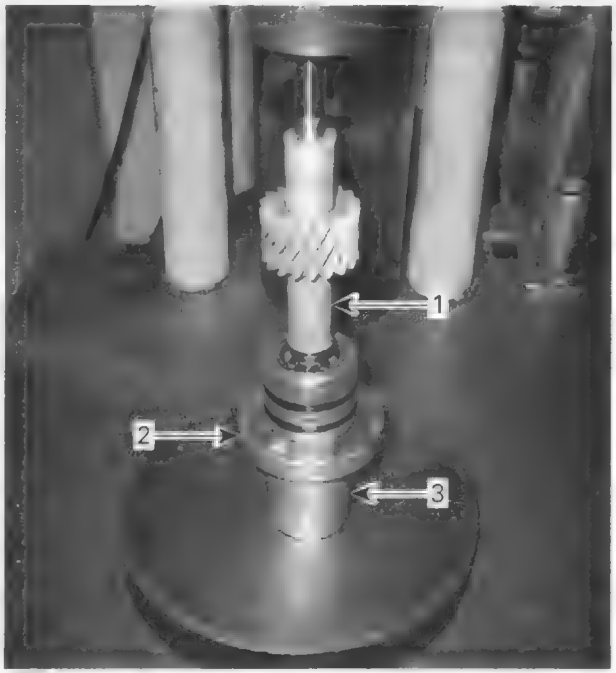


1. Water/oil pump shaft
2. Oil seal protector

Press water/oil pump shaft **no. 13** into the bearing housing **no. 8** with appropriate force.

CAUTION: Inadequate force will damage the oil seal no. 10 and bearing no. 11.

NOTE: During installation support the ceramic seal using the ceramic seal installer (P/N 529 036 014) as shown on the following illustration.



1. *Water/oil pump shaft*
2. *Bearing housing*
3. *Ceramic seal installer*

Remove oil seal protector from water/oil pump shaft.

Water/Oil Pump Shaft Installation

Pour 50 mL (2 U.S. oz) of injection oil in the pan under worm gear to lubricate pump gearing.

Install water/oil pump shaft assembly in crankcase half while turning shaft to mesh gears.

Torque bearing housing screws **no. 7**.

NOTE: The washer behind the impeller is thicker than on other engines. Ensure to use the 1 mm (.039 in) thick washer.

After impeller installation, ensure shaft turns properly.

Torque water pump housing screws in a criss-cross sequence.

Reinstall oil injection pump.

CRANKCASE

Crankcase Disassembly

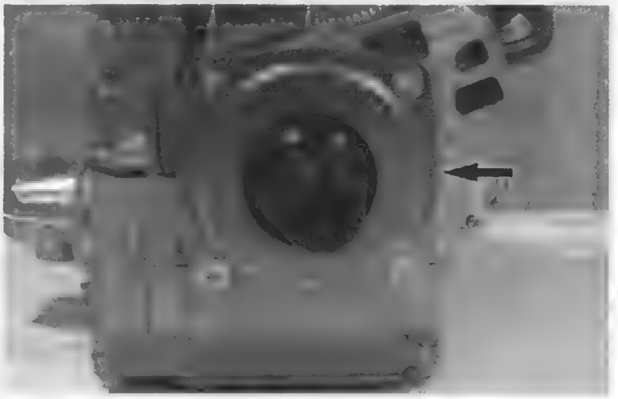
Remove engine, refer to *ENGINE REMOVAL AND INSTALLATION* section.

Remove cylinder head and cylinder-block. Refer to *TOP END (797)* section.

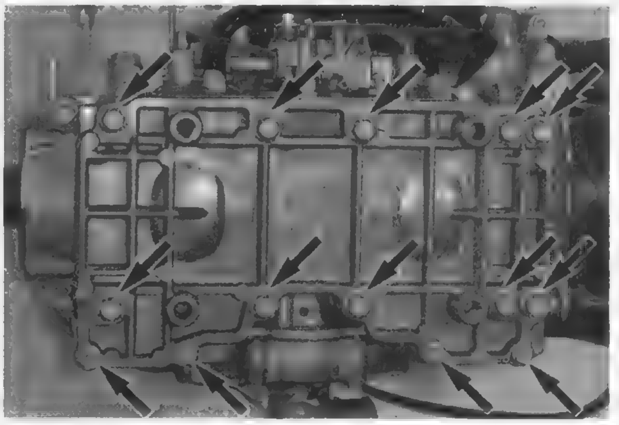
Remove magneto housing. Refer to *MAGNETO SYSTEM* section.

Remove PTO oil seal cover **no. 1**.

NOTE: Tap screw heads to break the Loctite bond.

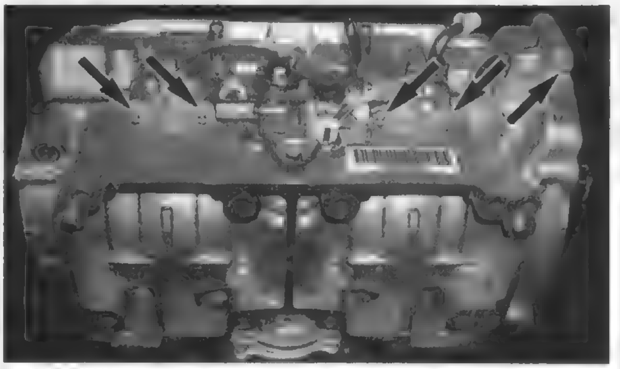


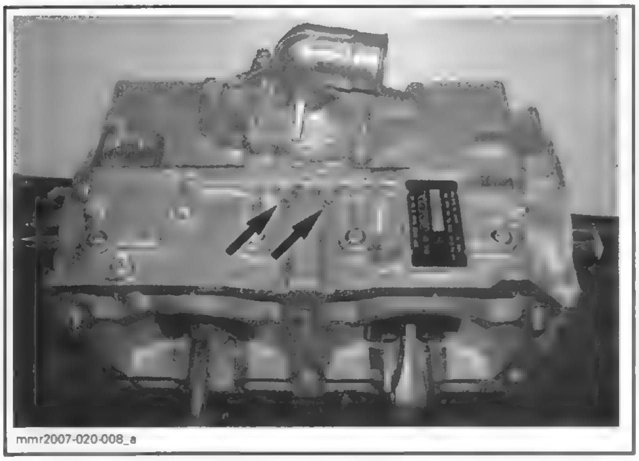
Remove base plate.



Remove engine front supports.

Remove all crankcase screws.





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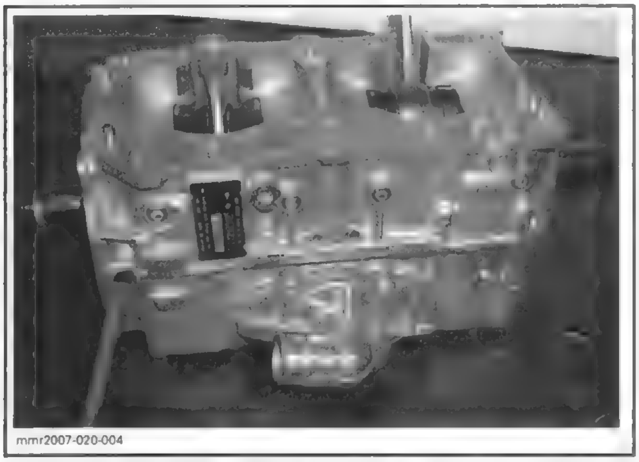
Split crankcase.

NOTE: To prevent damage to crankcase mating surfaces, use prying lugs to "unstick" crankcase.



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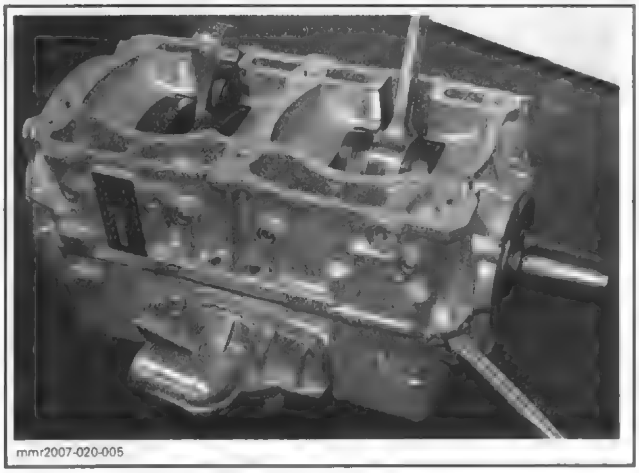


mmr2007-020-005

Remove crankshaft assembly.

Crankcase Cleaning

Clean all metal components in a non-ferrous metal cleaner. Use Loctite Chisel (P/N 413 708 500) accordingly.

CAUTION: Never use a sharp object to remove sealant as score marks incurred are harmful to crankcase sealing.

Crankcase Inspection

Check crankcase for cracks or other damages. Replace if necessary.

Crankcase Assembly

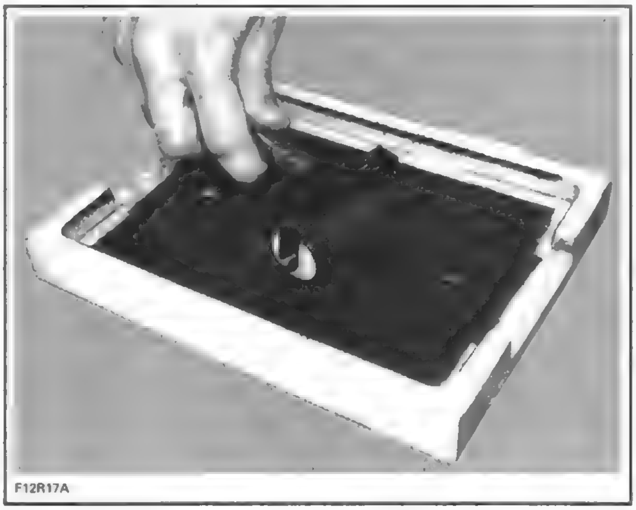
Install crankshaft in lower crankcase. See *CRANKSHAFT* for procedure.

Apply Loctite 5910 (P/N 293 800 081) on crankcase halves as per following procedure.

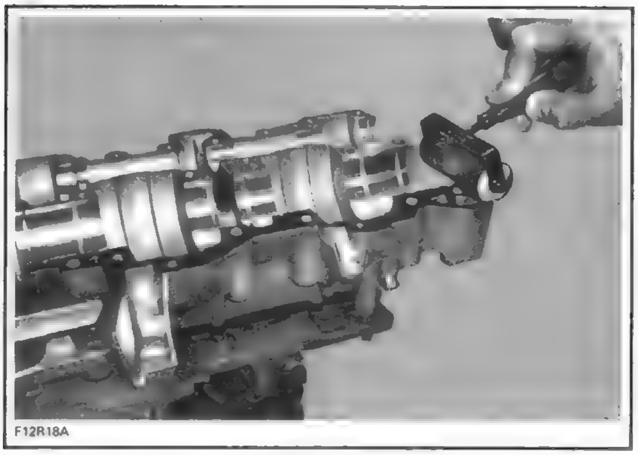
IMPORTANT: The total assembly sequence, including sealing compound application and crankcase torquing, must be performed within 10 minutes.

Use a plexiglass plate and apply some sealant on it. Use a 50 - 75 mm (2 - 3 in) soft rubber roller and spread the sealant to get a thin uniform coat on the plate (spread as necessary). When ready, apply the sealant on crankcase mating surfaces.

NOTE: If you do not use the roller method, you may use your finger to uniformly distribute the sealant.

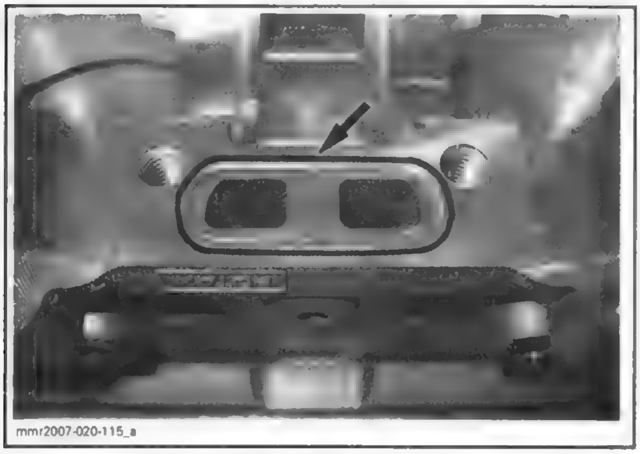


F12R17A



TYPICAL

Spread a small bead of sealant around the water passage groove as illustrated.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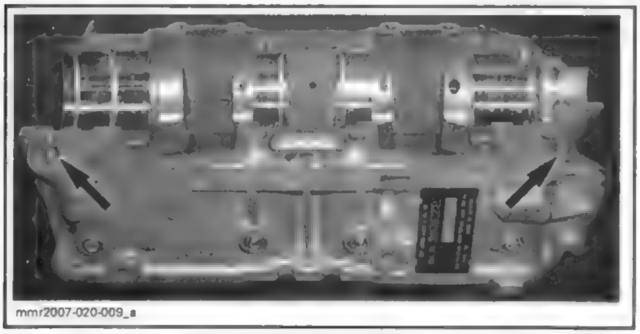
Ensure dowel pins are in their holes.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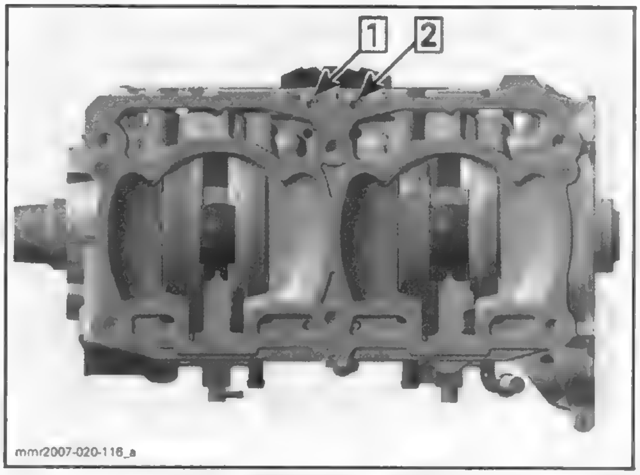
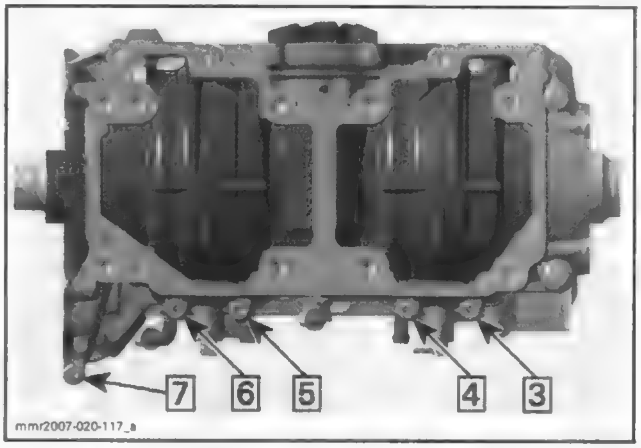
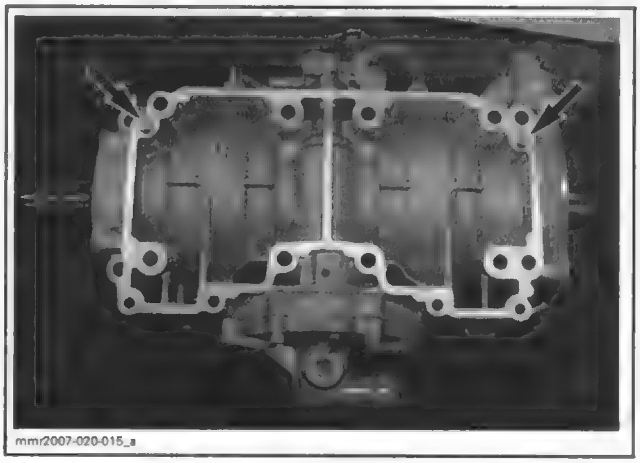
Assemble both crankcase halves.

Install M6 screws in crankcase. Torque to 11 N•m (97 lbf•**in**) as per illustrated sequence.


1
2
mmr2007-020-116_a


7
6
5
4
3
mmr2007-020-117_a

Ensure dowel pins are in their holes.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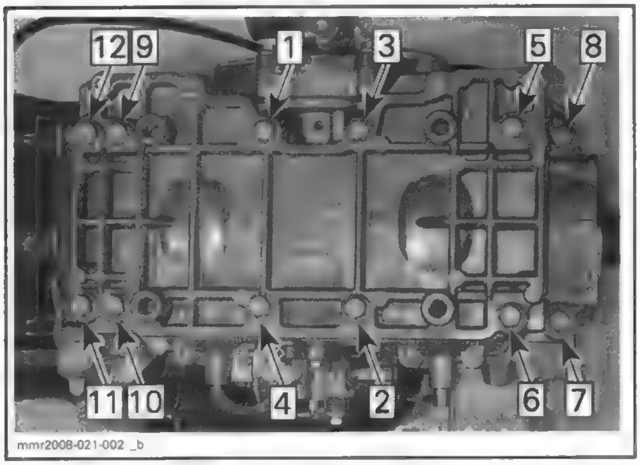
Install engine support.

NOTE: Ensure to install a new gasket.

Install M8 screws in crankcase.

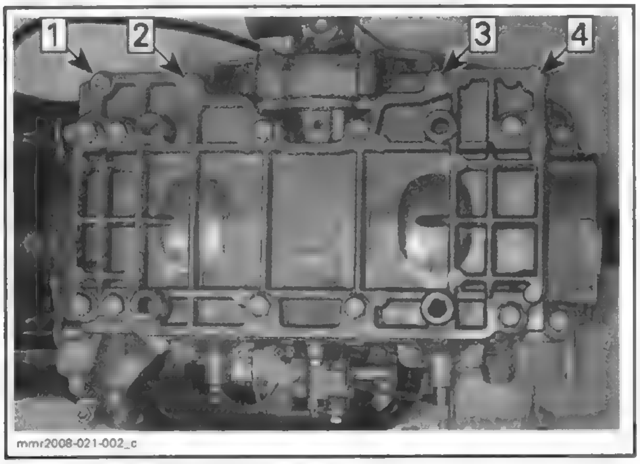
As a first step, torque M8 screws following the illustrated sequence to14 N•m (124 lbf•**in**).

Then, torque M8 screws following the same sequence to 29 N•m (21 lbf•ft).



TORQUE TO 29 N•M (21 LBF•FT) IN 2 STEPS

Finish by torquing crankcase M6 screws following the illustrated sequence to 11 N•m (97 lbf•**in**).



*TORQUE TO 11 N•M (97 LBF•**IN**)*

Install PTO oil seal cover **no. 1**.

CAUTION: After rebuilding an engine always observe a break-in period as described in *OPERATOR'S GUIDE*.

NOTE: It is recommended to test engine cooling system for leak after engine assembly, before installation in vehicle. Refer to *COOLING SYSTEM*.

CRANKSHAFT

Crankshaft Removal

To remove crankshaft, use crankcase disassembly procedure.

Crankshaft Inspection

Refer to table below to find bottom end engine dimension specifications. For dimension measurement procedures, refer to *ENGINE MEASUREMENT*.

ENGINE MEASUREMENT	TOLERANCES		
	NEW PARTS (min.)	(max.)	WEAR LIMIT
Crankshaft deflection on PTO side	N.A.	0.06 mm (.0024 in)	N.A.
Crankshaft deflection on MAG side	N.A.	0.05 mm (.002 in)	N.A.
Crankshaft deflection in center of crankshaft	N.A.	0.04 mm (.0016 in)	N.A.
Connecting rod big end axial play	0.23 mm (.0091 in)	0.617 mm (.0242 in)	1.20 mm (.047 in)
Crankshaft end-play	0.10 mm (.004 in)	0.30 mm (.012 in)	N.A.

Crankshaft Bearing Removal

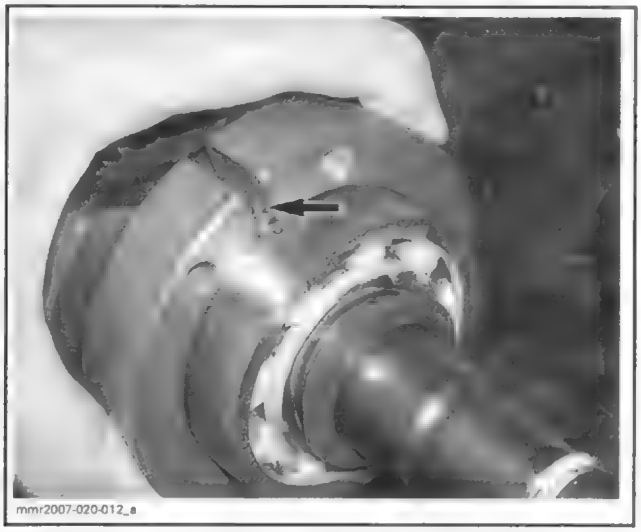
NOTE: 10 minutes is required to heat up a new bearing for its installation, To save time, it is recommended to start the heating process prior to bearing removal operation. See procedure further.

To remove bearings **no. 2** and **no. 3** from crankshaft **no. 4**, install proper half rings and puller ring on the outer bearing.

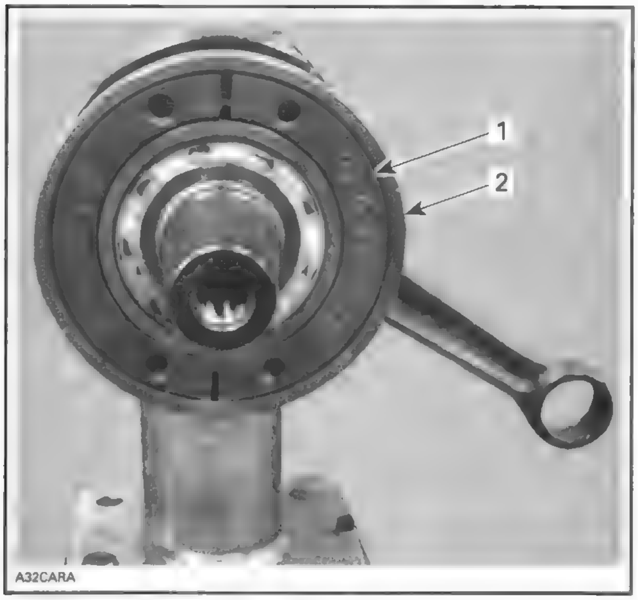
NOTE: On MAG side, position tools on inner bearing and pull out both bearings together.

PART	MAG SIDE	PTO SIDE
Half rings	420 977 475	420 977 479
Puller ring	420 977 490	420 977 494
Crankshaft protector	420 876 557	420 877 414

Ensure to position bearing pin between half ring gap.



MAG SIDE

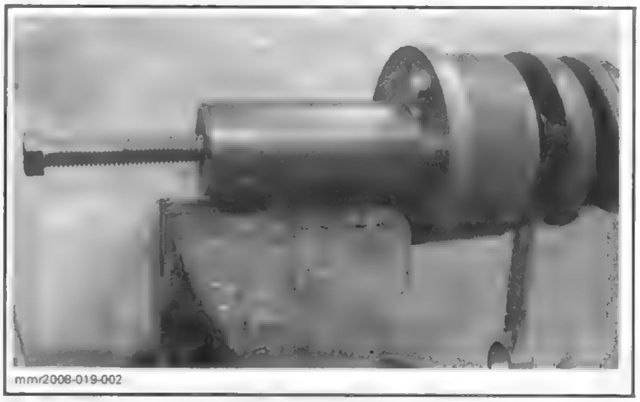


PTO SIDE
1. *Half ring*
2. *Puller ring*

NOTE: Apply grease on crankshaft end in order to hold in place the proper crankshaft protector.

Using screws (P/N 420 840 681), install bearing puller (P/N 529 036 004) on the half rings.

Secure the bearing puller in a vise by one of its rib.



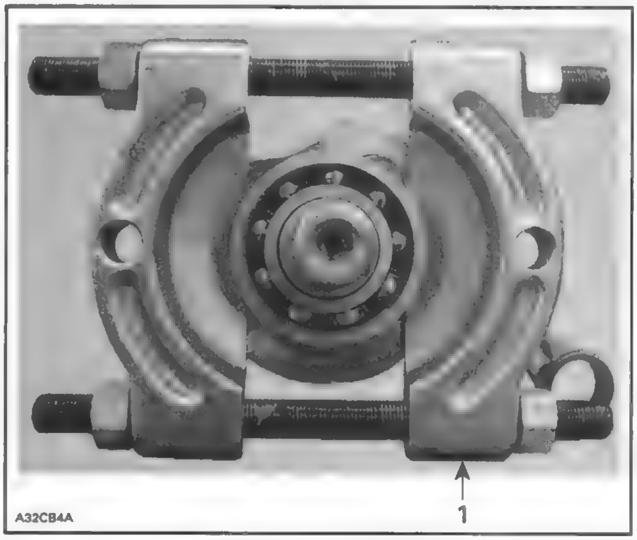
BEARING PULLER SECURED IN THE VISE

CAUTION: Never use any air impact tool for tightening the puller bolt. Lubricate the bolt with XP-S Lube (P/N 293 600 016) to avoid damaging the threads.

Screw in the puller bolt until the bearing comes out.

Follow the same procedure for the inner bearing (PTO side).

NOTE: As an alternate method to remove bearings, use Snap-on bearing separator (P/N CJ 951) or SPX/OTC bearing separator (P/N 1124). Use a press to remove bearings.



1. *Bearing separator*

Crankshaft Bearing Installation

Inspect crankshaft ends for damage.

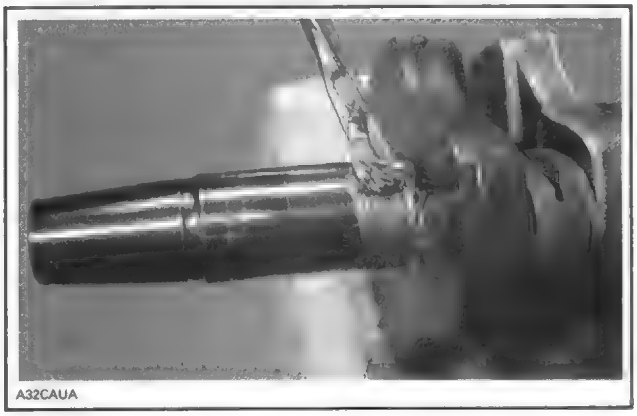
Clean crankshaft ends with sand paper no. 180 to remove possible seal marks and debris.

A32CB5A

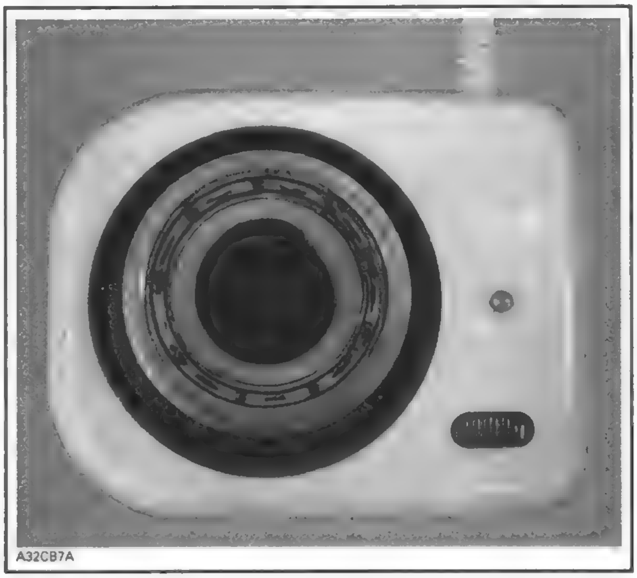
A32CBWB

Remove all residue using pulley flange cleaner (P/N 413 711 809).

Smear Loctite 767 (antiseize lubricant) (P/N 293 800 070) on part of crankshaft where bearing is installed.


A32CAUA

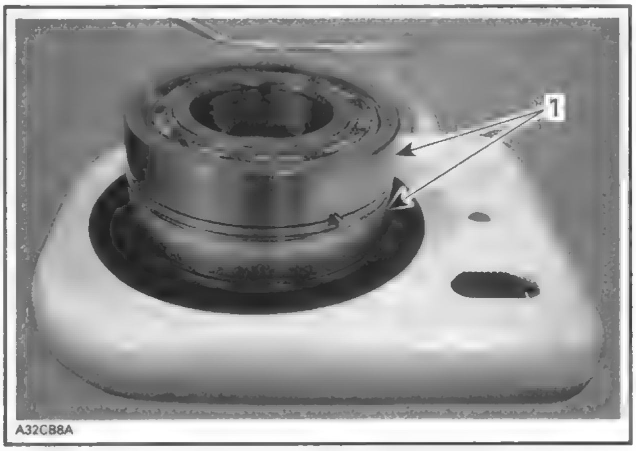
Heat up the bearing(s) using bearing heater (P/N 529 035 969). This will expand bearings and ease installation. If required, put a suitable plate or shim to avoid the direct contact between integrated seal with the heating surface.


A32CB7A

CAUTION: Bearing(s) should not be heated to more than 80°C (176°F). Do not heat bearing(s) on direct flame, or with a heat gun or in an oil bath. Inappropriate bearing(s) heating may result in inner seals or cage failure.

For even heat distribution, turn bearing several times during heating process.

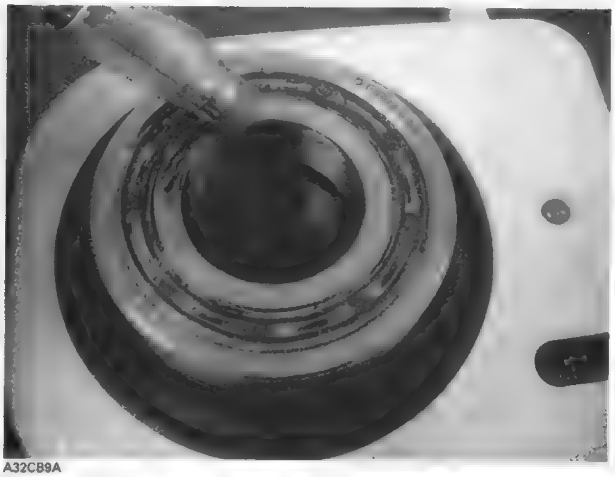
NOTE: Two bearings can be heated at the same time on one bearing heater.



A32CB8A

1. Bearings

Probe the inner race of the bearing with the temperature indicator stick (P/N 529 035 970). Stick will liquefy when the bearing reaches the proper temperature.



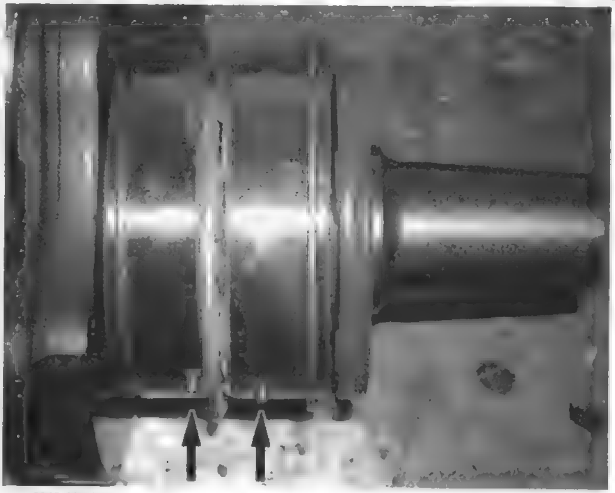
A32CB9A

⚠ WARNING

Do not touch heated bearing with bare hands. Always wear heat resisting gloves before handling the heated bearing(s).

CAUTION: Never reinstall a bearing that has been removed.

NOTE: Install PTO bearings on crankshaft so that locating pins will be positioned as shown.



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PTO SIDE

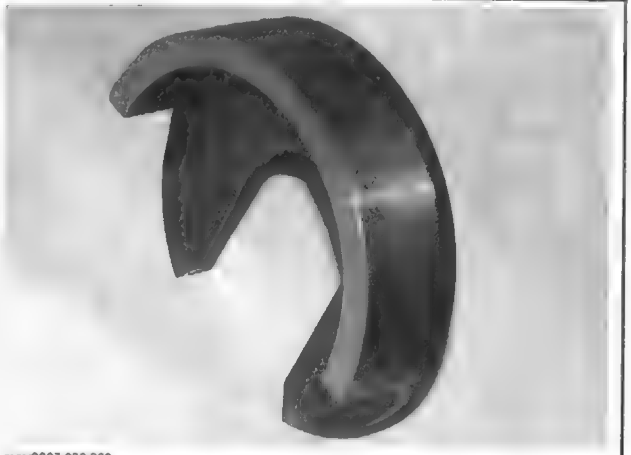
Slide the heated inner PTO bearing on crankshaft until it bottoms on crankshaft shoulder.

A32CAVA

NOTE: Heated bearing should slide easily onto the crankshaft. If required, push with a steel tube on the inner race of the bearing.

Install retaining disc.

Install distance gauge (P/N 529 036 060) as shown.



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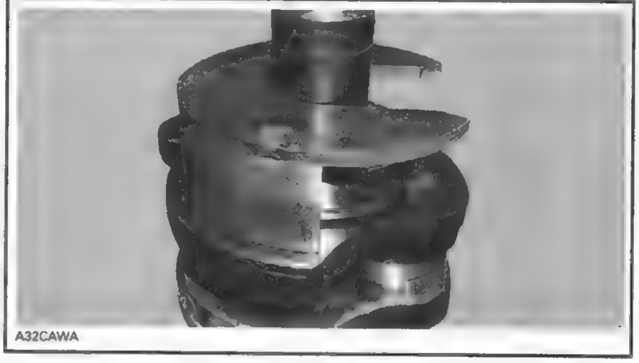
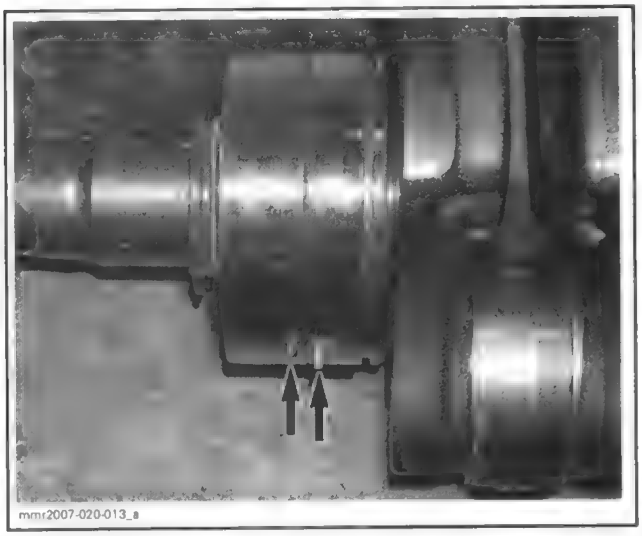


A32CAWA

TYPICAL

Slide the heated outer PTO bearing onto the crankshaft until it contacts the distance gauge.

NOTE: Install MAG bearings on crankshaft so that locating pins will be positioned as shown.



MAG SIDE

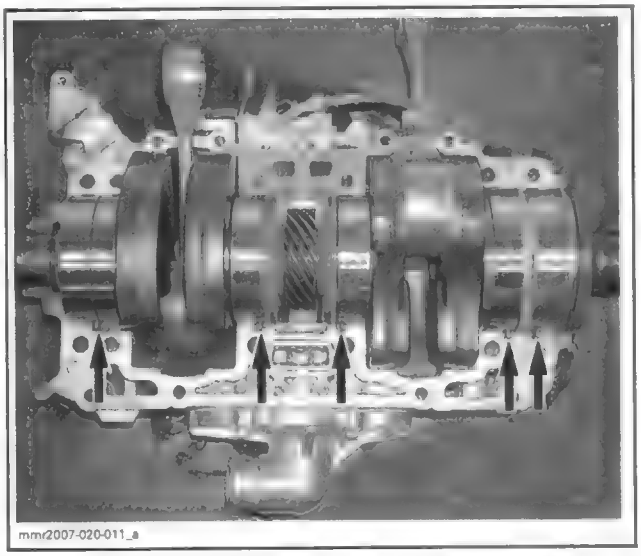
Slide the inner MAG bearing until it bottoms on crankshaft shoulder.

NOTE: Heated bearing should slide easily onto the crankshaft. If required, push with a steel tube on the inner race of the bearing.

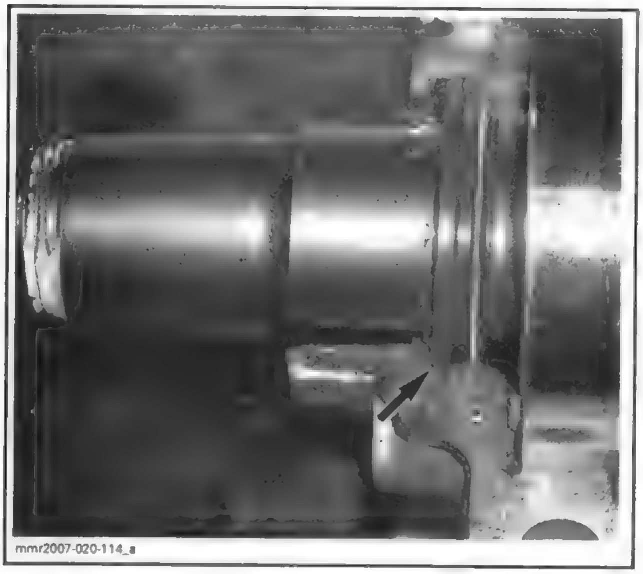
Slide the outer bearing until it sits on inner bearing.

Crankshaft Installation

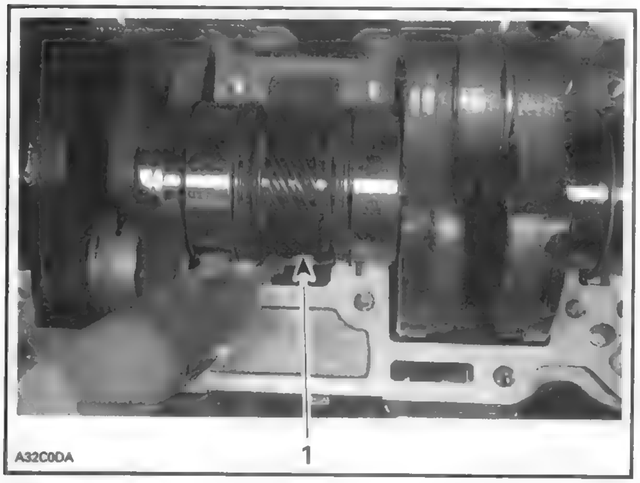
At crankshaft installation, position drive pins in their recess as illustrated.



Pay attention to properly locate MAG seal in its groove.



Pour 50 mL (2 U.S. oz) of injection oil in the oil bath under central gear as shown.



TYPICAL
1. Oil bath

Apply Isoflex grease (P/N 293 550 021) as per following procedure:

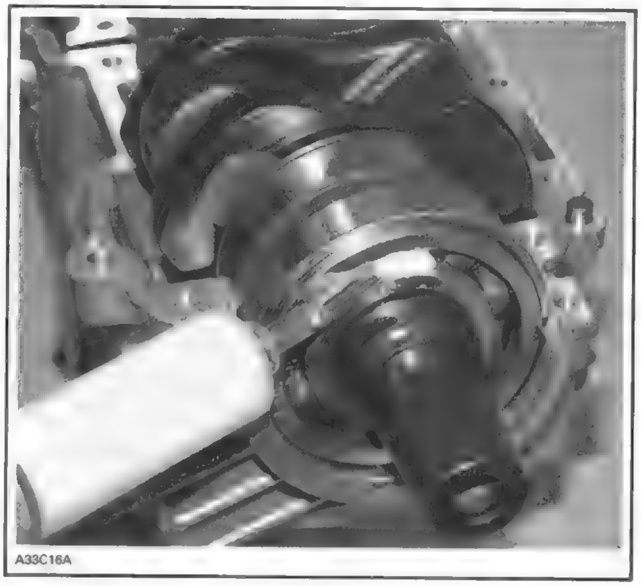
CAUTION: Use only the recommended grease. Make sure not to push grease between outside bearing race and half crankcase.

Put approximately 25 mL of grease in a syringe.

NOTE: The 50 g tube corresponds to 50 mL of grease.

CAUTION: **Do not exceed the recommended amount of grease.**

With the syringe, fill the PTO side outer bearing with 19 mL of grease.



NOTE: Inner PTO bearing is already filled with grease (about 8 mL).

Apply 5 mL of grease to MAG side outer bearing.

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NOTE: Inner MAG bearing is already filled with grease (about 5 mL).

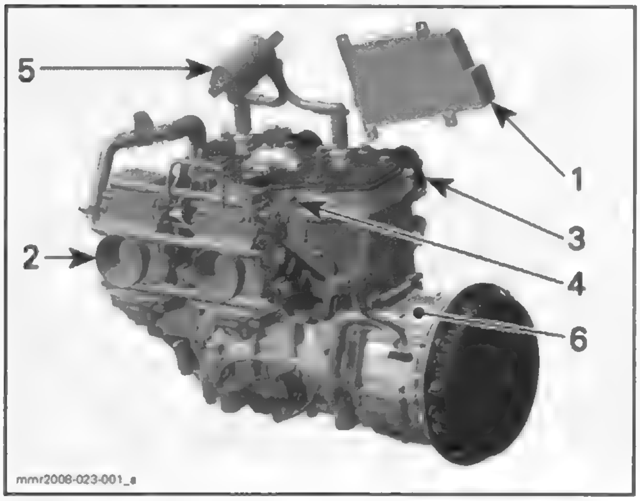
Install MAG seal.

ENGINE MANAGEMENT (500SS)

OVERVIEW

The engine management system (EMS) controls the following main systems:

- Ignition system
- Rotax Electronic Reverse (RER)
- Starting system (electric start models)
- Digitally Encoded Security System (DESS).



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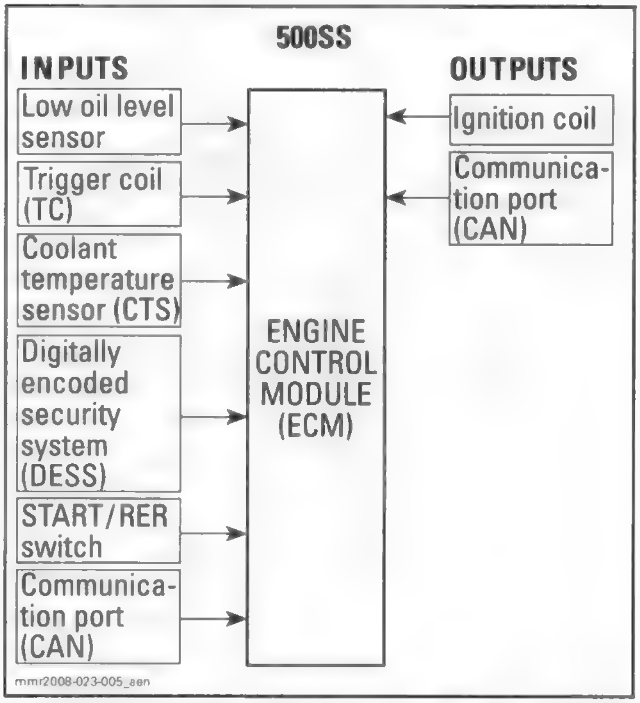
1. *Engine control module (ECM)*
2. *TM carburetors*
3. *RAVE valves*
4. *Coolant temperature sensor (CTS)*
5. *Ignition coil*
6. *Trigger coils (2)*

The EMS also offers a monitoring system and diagnostic mode to help troubleshooting some problems. Refer to *MONITORING SYSTEM/FAULT CODES* section.

ENGINE CONTROL MODULE (ECM)

The ECM and the multifunction gauge communicate together through the CAN lines (Controller Area Network).

The engine control module (ECM) is the brain of the engine management system.


500SS
INPUTS
OUTPUTS
Low oil level sensor
Trigger coil (TC)
Coolant temperature sensor (CTS)
Digitally encoded security system (DESS)
START/RER switch
Communication port (CAN)
ENGINE CONTROL MODULE (ECM)
Ignition coil
Communication port (CAN)

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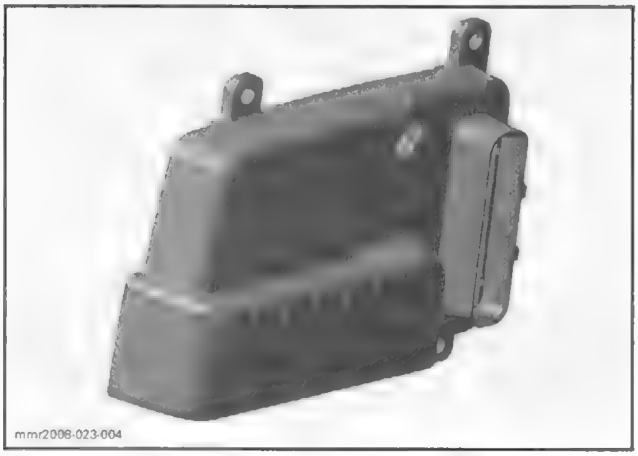

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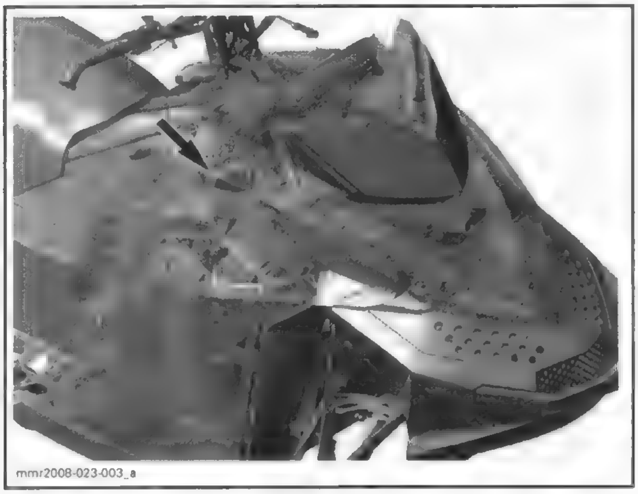
ECM

NOTE: To test the ECM, refer to *IGNITION SYSTEM*.

The ECM is located under the hood.



Ignition System

A CDI ignition system is used. The ECM sends the current to the primary winding of the ignition coil.

Ignition Timing

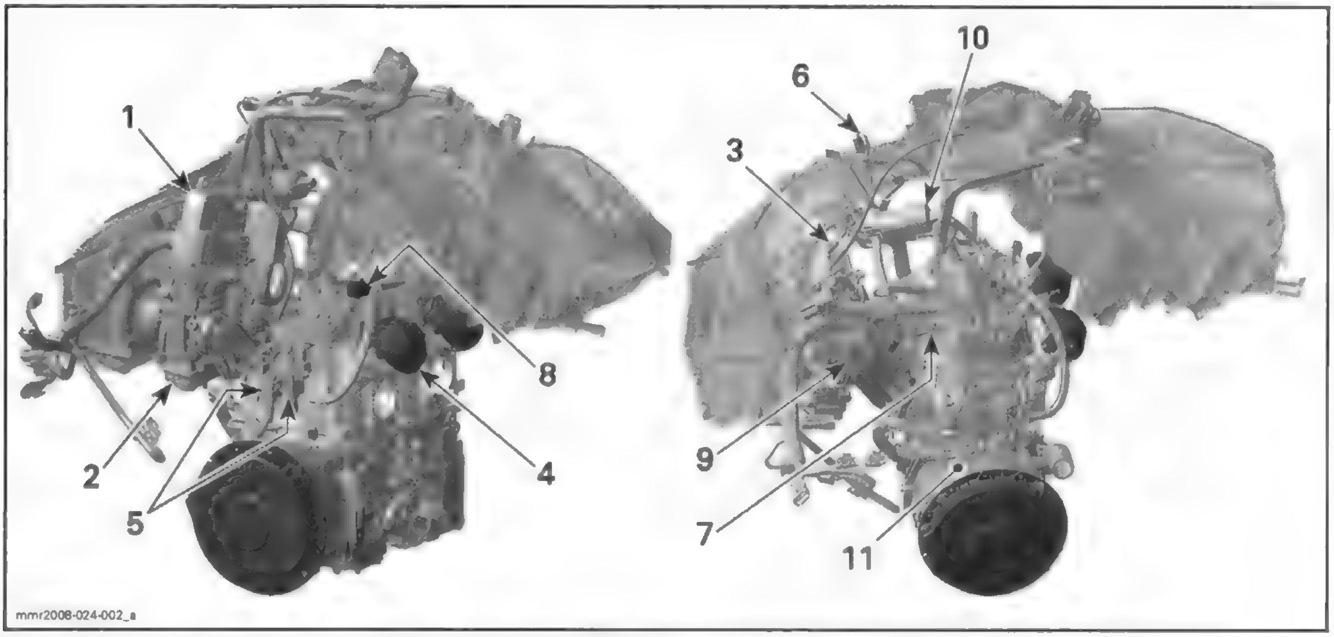
The ECM is programmed for optimum ignition timing under all operating conditions. Using operating conditions provided by the sensors, the ECM controls the ignition timing for optimum engine operation.

Engine RPM Limiter

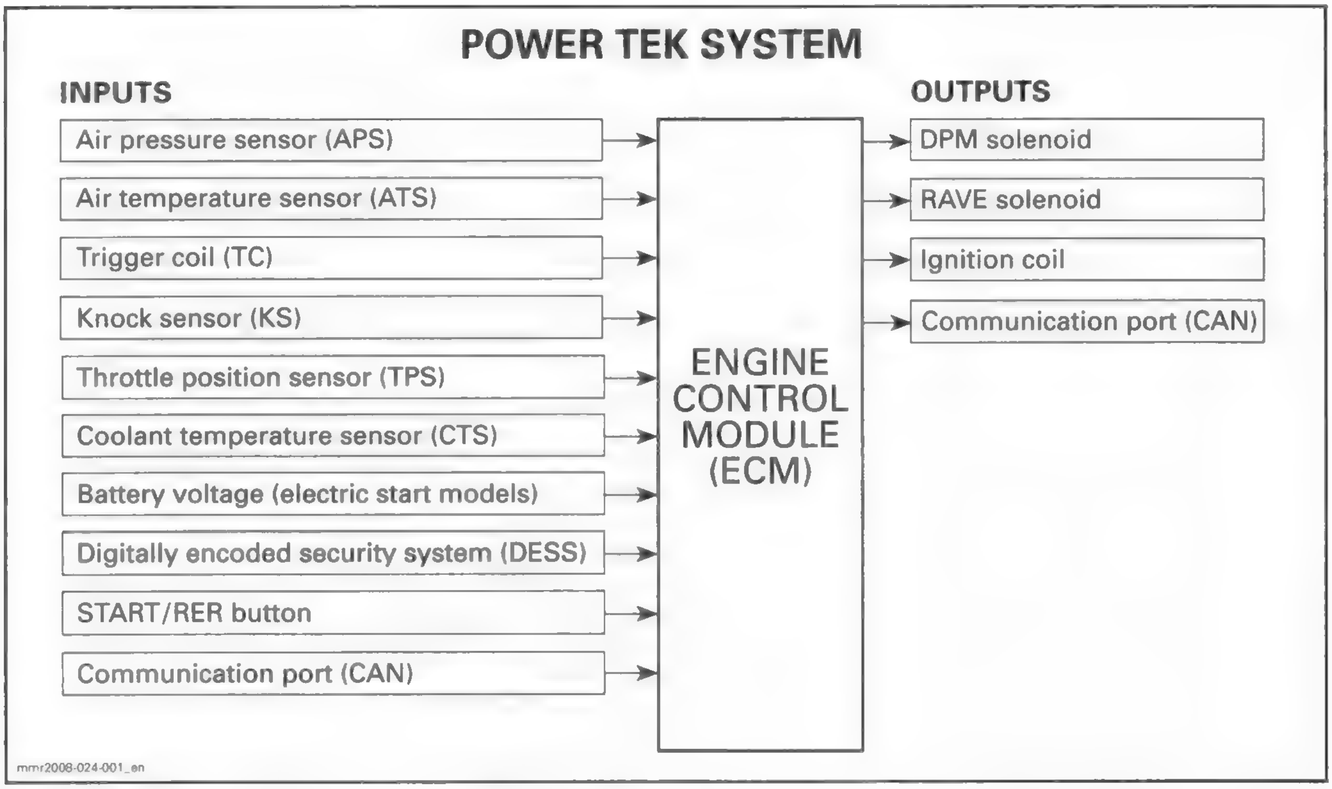
The ECM will limit the maximum engine speed (approximately 8600 RPM).

ENGINE MANAGEMENT (800R)

OVERVIEW



1. Engine control module (ECM) including air pressure sensor (APS)
2. TM carburetors
3. DPM manifold
4. RAVE valves
5. RAVE valve solenoid
6. Air temperature sensor (ATS)
7. Coolant temperature sensor (CTS)
8. Knock sensor (KS)
9. Throttle position sensor (TPS)
10. Ignition coil
11. Trigger coil


POWER TEK SYSTEM
INPUTS
Air pressure sensor (APS)
Air temperature sensor (ATS)
Trigger coil (TC)
Knock sensor (KS)
Throttle position sensor (TPS)
Coolant temperature sensor (CTS)
Battery voltage (electric start models)
Digitally encoded security system (DESS)
START/RER button
Communication port (CAN)
ENGINE CONTROL MODULE (ECM)
OUTPUTS
DPM solenoid
RAVE solenoid
Ignition coil
Communication port (CAN)
mmr2008-024-001_en

The acronym Power TEK refers to the following technologies found on this engine:

Throttle position sensor

Electronic RAVE

Knock sensor.

For this 800R Power TEK, a TPS and a knock sensor have been added to provide inputs to the ECM. The ECM electronically controls the electric RAVE valve solenoid and the DPM solenoid. This achieves an improved fuel economy, a cleaner engine for emission requirements and improved engine protection (against seizure).

The use of a TPS along with the trigger coils (engine RPM) allows the ECM to recognize the engine load and thus using 3D DPM and ignition maps.

The engine management system (EMS) controls the following main systems:

- Ignition system
- 3D RAVE system
- Digital Performance Management (DPM)
- Rotax Electronic Reverse (RER)
- Digitally Encoded Security System (DESS)
- Starting system (electric start models).

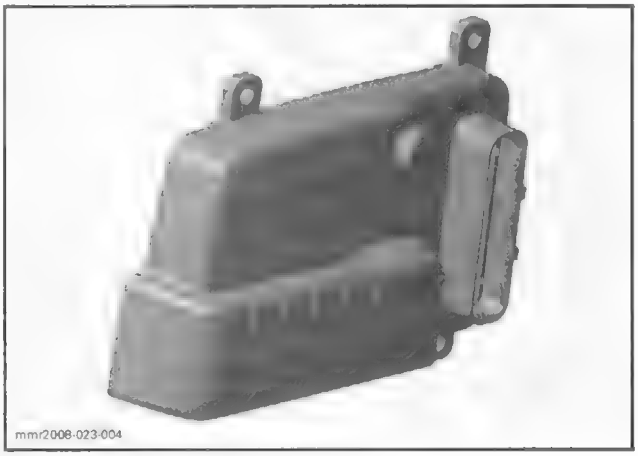
The EMS also offers a monitoring system and diagnostic mode to help troubleshooting some problems. Refer to *MONITORING SYSTEM/FAULT CODES* section for more details.

The engine warm up is electronically controlled. The ignition timing, fuel delivery and 3-D RAVE opening are varied to limit power output on a cold engine to reduce the chance of engine damage. This type of limitation is RPM-related and the warm-up period should be seamless.

NOTE: When engine coolant temperature is below 5°C (41°F), the RAVE valves will be kept closed.

ENGINE CONTROL MODULE (ECM)

The engine control module (ECM) is the brain of the engine management system.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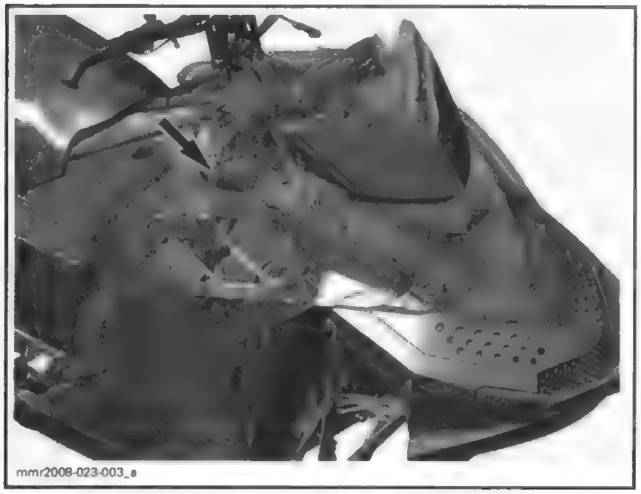
ECM

The ECM applies the proper ignition and DPM maps for optimum engine operation in all riding conditions.

The ECM and the multifunction gauge communicate together through the CAN lines (Controller Area Network).

The ECM is located under the hood.



Ignition System

A CDI ignition system is used. The ECM sends the current to the primary winding of the ignition coil.

NOTE: To test the ECM, refer to *IGNITION SYSTEM*.

Ignition Timing

The ECM is programmed for optimum ignition timing under all operating conditions. Using operating conditions provided by the sensors, the ECM controls the ignition timing for optimum engine operation.

Knock Sensor

A knock sensor is mounted on top of the cylinder head. It detects specific vibration that would be typically generated by engine detonation.

When knocking occurs, the ECM temporarily retards ignition timing and enrichens fuel mixture until knocking disappears. Then, previous parameters automatically resume as required. Refer to *COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE*.

NOTE: Occasional knocking will not generate a fault code. If knocking occurrence goes over a certain threshold, a fault code will be generated.

Refer to *IGNITION SYSTEM* to test the knock sensor.

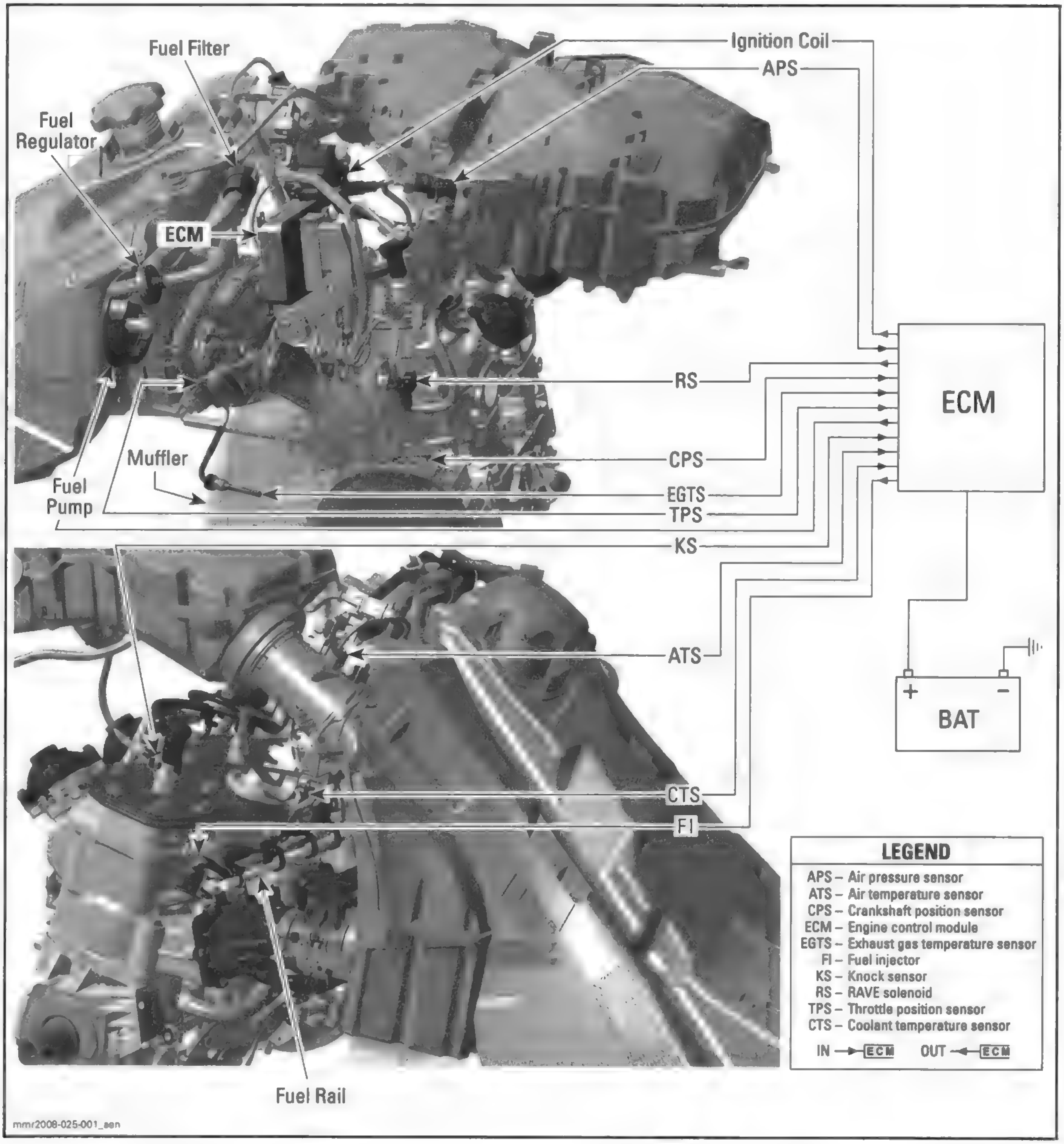
Engine RPM Limiter

The ECM will limit the maximum engine speed (approximately 8600 RPM).

Digital Performance Management (DPM)

To test the air temperature sensor (ATS) and the air pressure sensor (APS), refer to *DIGITAL PERFORMANCE MANAGEMENT (DPM)* section.

ENGINE MANAGEMENT (600 HO SDI)


Fuel Filter
Fuel Regulator
ECM
Ignition Coil
APS
RS
ECM
CPS
EGTS
TPS
KS
Muffler
Fuel Pump
ATS
+
–
BAT
CTS
FI
Fuel Rail
LEGEND
APS – Air pressure sensor
ATS – Air temperature sensor
CPS – Crankshaft position sensor
ECM – Engine control module
EGTS – Exhaust gas temperature sensor
FI – Fuel injector
KS – Knock sensor
RS – RAVE solenoid
TPS – Throttle position sensor
CTS – Coolant temperature sensor
IN → ECM
OUT ← ECM

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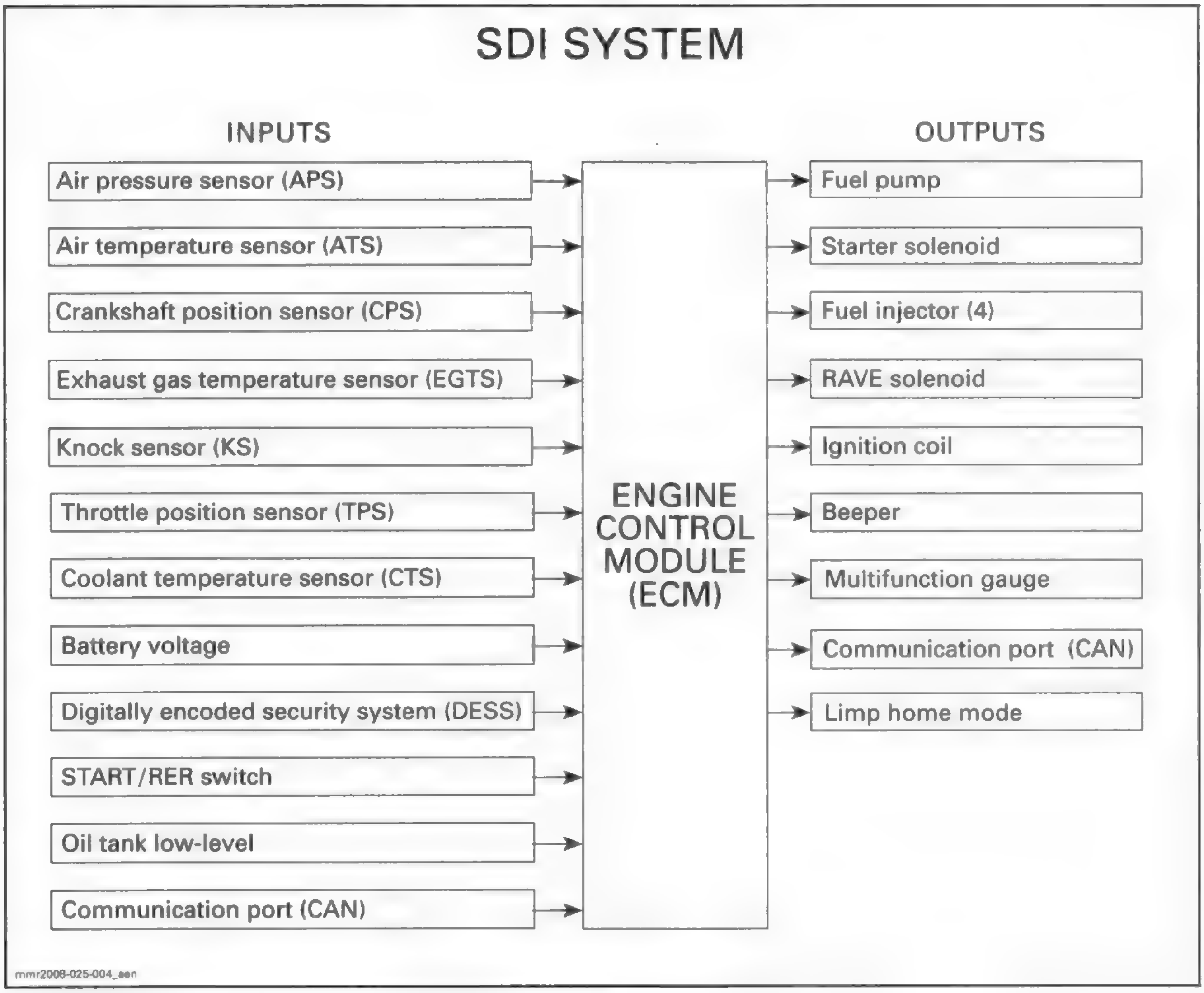
ENGINE MANAGEMENT SYSTEM FUNCTIONS


SDI SYSTEM
INPUTS
Air pressure sensor (APS)
Air temperature sensor (ATS)
Crankshaft position sensor (CPS)
Exhaust gas temperature sensor (EGTS)
Knock sensor (KS)
Throttle position sensor (TPS)
Coolant temperature sensor (CTS)
Battery voltage
Digitally encoded security system (DESS)
START/RER switch
Oil tank low-level
Communication port (CAN)
ENGINE CONTROL MODULE (ECM)
OUTPUTS
Fuel pump
Starter solenoid
Fuel injector (4)
RAVE solenoid
Ignition coil
Beeper
Multifunction gauge
Communication port (CAN)
Limp home mode

mmr2008-025-004_aen

OVERVIEW

For this SDI 2-stroke engine, an Engine Management System (EMS) has been used to ensure a high power output combined with cleaner combustion. An Engine Control Module (ECM) calculates the proper air/fuel mixture, ignition timing for each cylinder separately.

There are 6 main systems that are controlled by the engine management system (EMS):

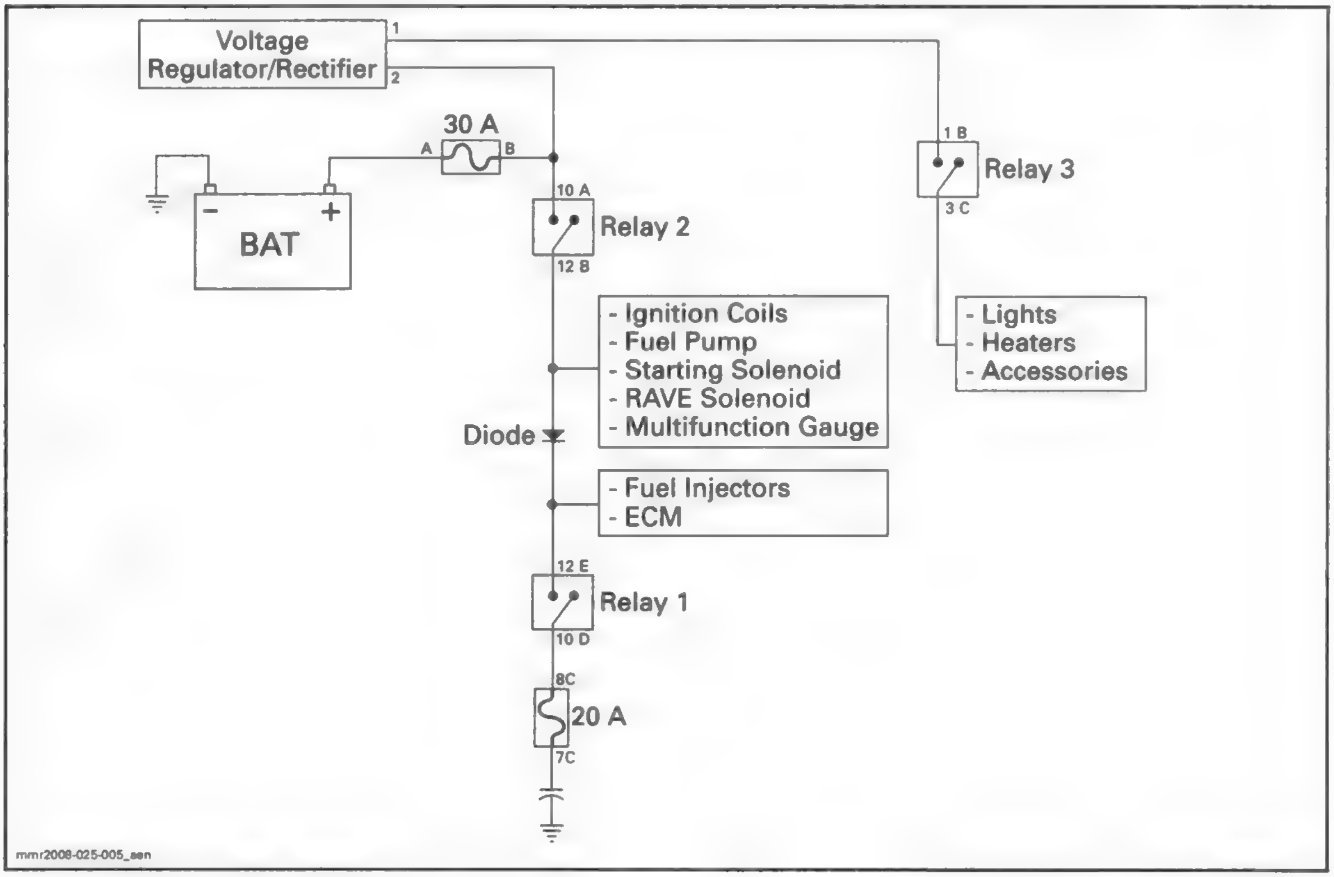
- Semi-direct injection
- Ignition system
- Starting system
- E-Rave
- DESS (Digitally Encoded Security System)
- RER (Rotax Electronic Reverse).

The EMS features a monitoring system that self-diagnose its electronic components. Refer to *MONITORING SYSTEM/FAULT CODES* section for more details.

Power Distribution

The system uses 3 relays:

- R1: capacitor circuit
- R2: ignition coils electric fuel pump, starting solenoid, RAVE solenoid, multifunction gauge and relay 1
- R3: lighting system, heaters and the accessories.


Voltage Regulator/Rectifier
1
2
30 A
A
B
BAT
-
+
10 A
Relay 2
12 B
1 B
Relay 3
3 C
- Ignition Coils
- Fuel Pump
- Starting Solenoid
- RAVE Solenoid
- Multifunction Gauge
- Lights
- Heaters
- Accessories
Diode
- Fuel Injectors
- ECM
12 E
Relay 1
10 D
8C
20 A
7C
mmr2008-025-005_aen

While cranking, the magneto sends AC current to the voltage regulator/rectifier that in turn, sends a signal to the ECM. This wakes up the Engine Management System and activates the relay (R1) and the relay (R2). Just a small rotation of the engine is needed to wake-up the ECM.

IMPORTANT: Engine-related actuators and injectors are continuously powered from the battery when ECM is woken up. **The ECM switches the ground to complete the electrical circuits it controls.** Take this into account when troubleshooting the electrical system.

The RER switch may also be used to wake-up the Engine Management System.

Waking-up the EMS before doing a start attempt result in faster start-up.

The battery is required to supply voltage to the ECM and to the fuel pump to allow a fuel pressure buildup. An easy way to acknowledge if the Engine Management System is woken-up, verify if multifunction gauge is on.

The capacitor has two functions. It is used to stabilize battery voltage when the regulator/rectifier is charging the battery. It also gives the possibility to be able to start the engine even if the battery is very low. In this case, starting the engine may be more difficult and will require the very complete stroke of the starting rope.

The capacitor relay prevents the capacitor to be connected to the battery when the engine is not running to allow safe vehicle maintenance (disconnection and reconnection of the capacitor).

When engine reaches approximately 800 RPM, the ECM activates the headlights and accessory relay (R3).

ECM and Multifunction Gauge Voltage Supply

ECM and multifunction auge are supplied with voltage for 30 seconds when connecting the tether cord cap on its post and momentarily pressing the START/RER switch.

NOTE: On electric start models, setting engine cut-out switch to OFF will prevent engine starting.

NOTE: Each time the tether cord cap is connected to the post and START/RER switch is depressed, the fuel pump is activated for 2 seconds to build up pressure in the fuel injection system.

Automatic Power Shut-Down

The ECM is equipped with an automatic power shut-down. This feature prevents the battery from losing its charge if the tether cord cap is left on the post when the engine is not running for more then 30 seconds. The ECM will remain offline until the START/RER switch or the rewind starter is activated. The ECM will shut down all outputs after 5 seconds when the tether cord cap is removed.

ENGINE CONTROL MODULE (ECM)

The Engine Control Module (ECM) is the central part of the engine management system. It reads the inputs, makes computations, uses pre-determined parameters and sends the proper signals to the outputs for proper engine management.

SIEMENS VDO
ROTAX
A32E3AA

TYPICAL — ECM

The ECM features a permanent memory that will keep the programmed tether cord cap(s) code, fault codes and other vehicle information, even when the battery is removed from the vehicle.

Refer to *SEMI-DIRECT INJECTION (SDI)* for troubleshooting the ECM.

Semi-Direct Injection (SDI)

Refer to *SEMI-DIRECT INJECTION (SDI)* section for more details.

Ignition System

Ignition Timing

The ECM is programmed with data (it contains ignition mappings) for optimum ignition timing under all operating conditions. Using engine operating conditions provided by the sensors, the ECM controls the ignition timing for optimum engine operation.

Knock Sensor

A knock sensor is mounted on top of the cylinder head. It detects specific vibration that would be typically generated by engine detonation. If detonation occurs, the knock sensor detects it and the ECMs retards the ignition advance and extend the injection period temporarily (it goes in a specific mode) until detonation stops.

NOTE: To test the knock sensor, refer to *SEMI-DIRECT INJECTION (SDI)* section.

Engine RPM Limiter

The ECM will limit the maximum engine speed.

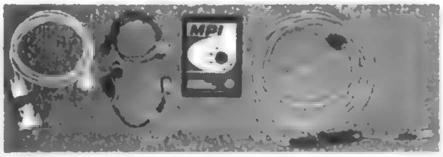
COMMUNICATION TOOLS/B.U.D.S. SOFTWARE

SERVICE TOOLS

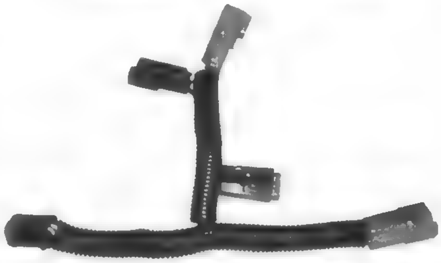
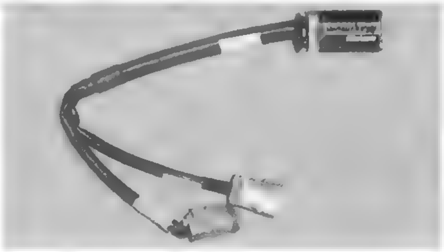
Description	Part Number	Page
9 V battery supply cable	529 035 675	182–183, 186, 188
Optional extension cable	529 035 697	185
Optional extension cable	529 035 703	181
Supply T-harness	529 035 869	182–183, 186–187
Communication kit	529 035 981	181
12 V battery supply cable	529 035 997	182–183, 186, 188
MPI-2	529 036 018	185, 187–188
DESS post interface	529 036 019	186–187
Diagnostic cable	710 000 851	185, 188

Two different MPI (Multi-Purpose Interface) can be used with B.U.D.S. software to communicate with the engine management system: MPI or MPI-2.

MULTI-PURPOSE INTERFACE (MPI)

PART REQUIRED	OPERATION		MODEL
	– PROGRAMMING KEY(S) – ENTERING CUSTOMER INFORMATION – SETTING IGNITION TIMING/CLOSED TPS – READING FAULT CODES	– ACTIVATION OF COMPONENTS (IGNITION COIL, FUEL PUMP ETC.)	
PC computer	X	X	All
B.U.D.S. software Use latest version available on BOSSWeb	X	X	All
Communication kit (P/N 529 035 981) 	X	X	All
Optional extension cable (P/N 529 035 703)	X	X	All

mmr2008-026

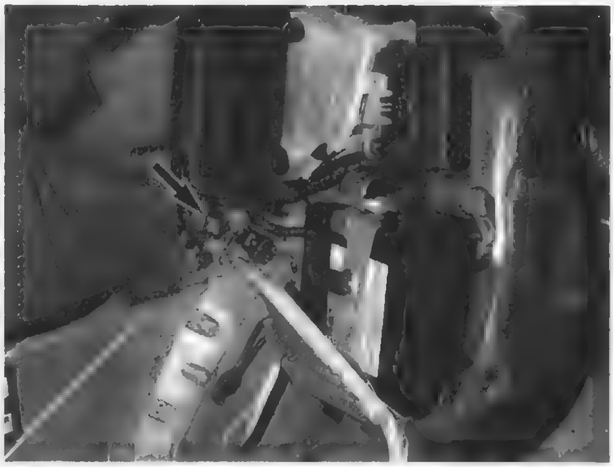
PART REQUIRED	OPERATION		MODEL
	– PROGRAMMING KEY(S) – ENTERING CUSTOMER INFORMATION – SETTING IGNITION TIMING/CLOSED TPS – READING FAULT CODES	– ACTIVATION OF COMPONENTS (IGNITION COIL, FUEL PUMP ETC.)	
Supply T-harness (P/N 529 035 869) 	X	X	All
9 V battery supply cable (P/N 529 035 675) 	X		500SS 800R
12 V battery supply cable (P/N 529 035 997)		X	500SS 800R

MPI Supply

The MPI can use the vehicle power for its supply. Four AA batteries or an AC/DC power supply can also be used. Make sure to respect MPI specification if a power supply is used.

MPI Connections with Vehicle

Remove the 6-pin connector from the protective cap on the right side of the vehicle.



mmr2008-033-065_a

mmr2008-033-066_a

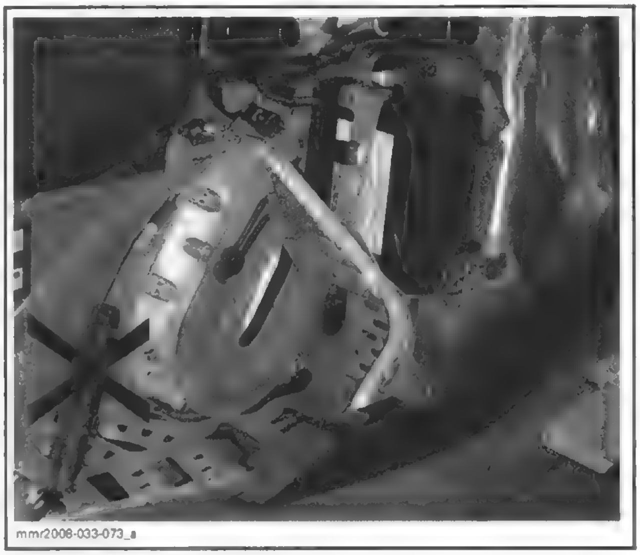
Connect supply T-harness (P/N 529 035 869), to vehicle 6-pin connector.

mmr2008-033-067_a

Connect the 6 pin diagnostic cable from MPI to supply T-harness.

mmr2008-033-068_a

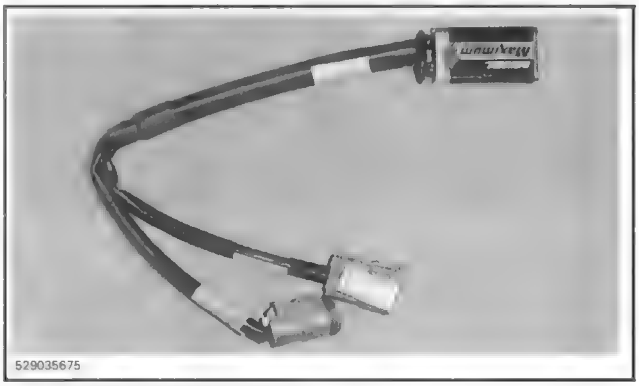
CAUTION: Connecting MPI directly to vehicle connector (without supply T-harness) may prevent proper communication. Always use the proper supply T-harness.


mmr2008-033-073_a

500SS/800R

Connect supply T-harness to a 12 V battery, using 12 V battery supply cable (P/N 529 035 997); or to a 9 V battery, using 9 V battery supply cable (P/N 529 035 675).

12 V BATTERY SUPPLY CABLE


529035675
Maximum

9 V BATTERY SUPPLY CABLE

NOTE: The 9 V battery allows programming keys, setting ignition timing, reset closed throttle, etc. The 12 V battery allows to activate solenoids, spark plugs, etc., from B.U.D.S. **Activation** tab. In this case, all sensors and actuators will be continuously supplied from the battery. The ECM will switch the circuit to the ground when activated through B.U.D.S. If engine starting is required, disconnect clips from battery.

600 HO SDI

These models do not need any external 9 V or 12 V power to allow programming and troubleshooting. The use of the supply T-harness will keep the ECM ON. Not using it will make the ECM shuts-off after a few seconds.

All Models

CAUTION: Always use the proper supply T-harness and cables. Ensure to respect polarity when connecting cable clips to battery. Match RED cables together.

NOTE (500SS/800R)

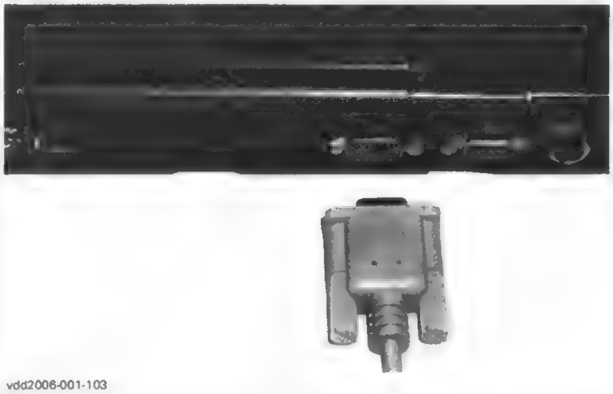
It is suggested to disconnect headlights fuse and to turn off heated grips to reduce battery discharge rate.

On manual start models, it is necessary to use an external 12 V battery and to connect the supply cable clips on it to supply ECM and sensors/actuators.

On electric start models, it is necessary to connect the supply cable clips to the battery to supply ECM and sensors/actuators.

NOTE: Some components will generate heat when leaving vehicle in diagnostic mode for a long period. Always disconnect MPI supply harness and supply cable from vehicle/battery when not working on vehicle.

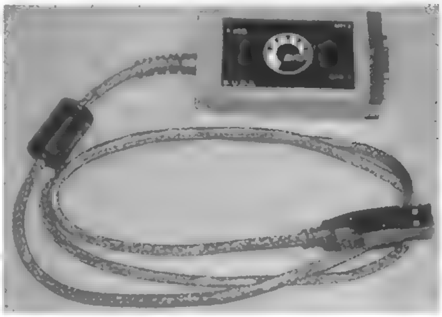
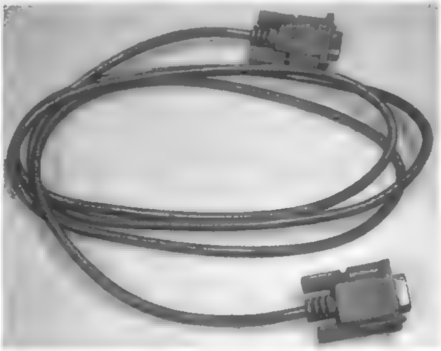
Connect remaining MPI connector to the serial port of a PC (personal computer).

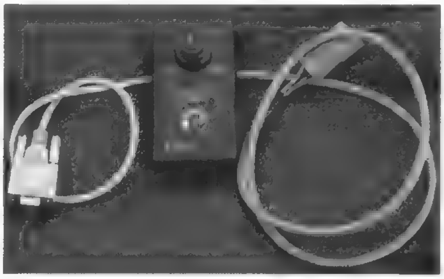
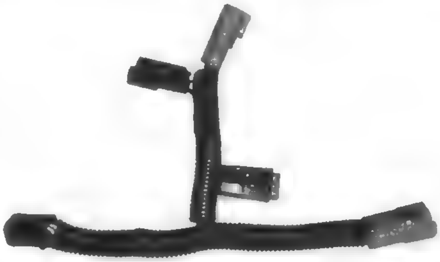
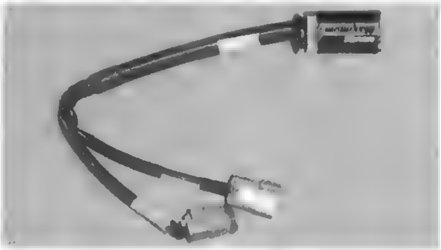


vdd2006-001-103

Use B.U.D.S. software as described further in *B.U.D.S. SOFTWARE*.

MULTI-PURPOSE INTERFACE-2 (MPI-2)

PART REQUIRED	OPERATION		MODEL
	– PROGRAMMING KEY(S) – ENTERING CUSTOMER INFORMATION – SETTING IGNITION TIMING/CLOSED TPS – READING FAULT CODES	– ACTIVATION OF COMPONENTS (IGNITION COIL, FUEL PUMP ETC.)	
PC computer	X	X	All
B.U.D.S. software Use latest version available on BOSSWeb	X	X	All
MPI-2 (P/N 529 036 018) 	X	X	All
Optional extension cable (P/N 529 035 697) 	X	X	All
Diagnostic cable (P/N 710 000 851)	X	X	500SS 800R

PART REQUIRED	OPERATION		MODEL
	– PROGRAMMING KEY(S) – ENTERING CUSTOMER INFORMATION – SETTING IGNITION TIMING/CLOSED TPS – READING FAULT CODES	– ACTIVATION OF COMPONENTS (IGNITION COIL, FUEL PUMP ETC.)	
DESS post interface (P/N 529 036 019) 	X	X	600 HO SDI
Supply T-harness (P/N 529 035 869) 	X	X	All
9 V battery supply cable (P/N 529 035 675) 	X		500SS 800R
12 V battery supply cable (P/N 529 035 997)		X	500SS 800R

MPI-2 Power Supply

MPI-2

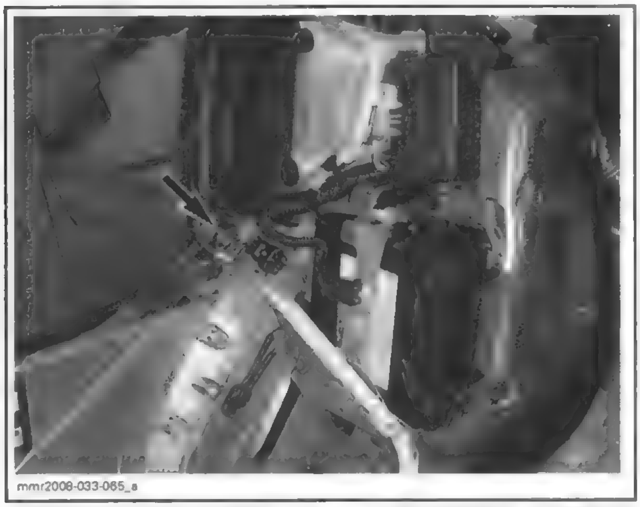
The MPI-2 uses the PC computer USB port for its power supply.

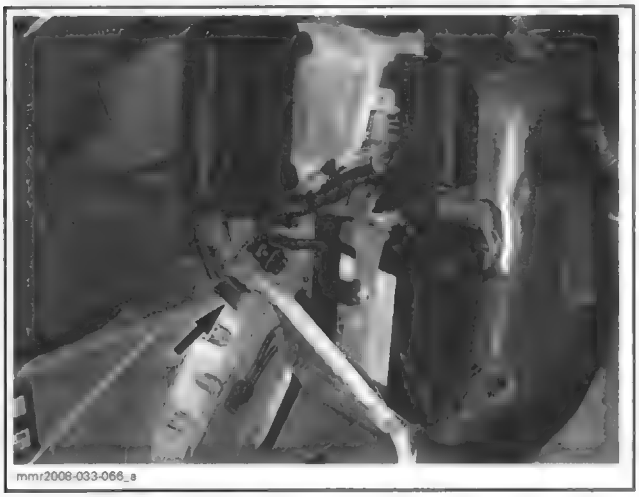
DESS Post Interface

The DESS post interface can use the vehicle power for its supply. Two AA batteries or an AC/DC power supply can also be used. Make sure to respect the interface specification if a power supply is used.

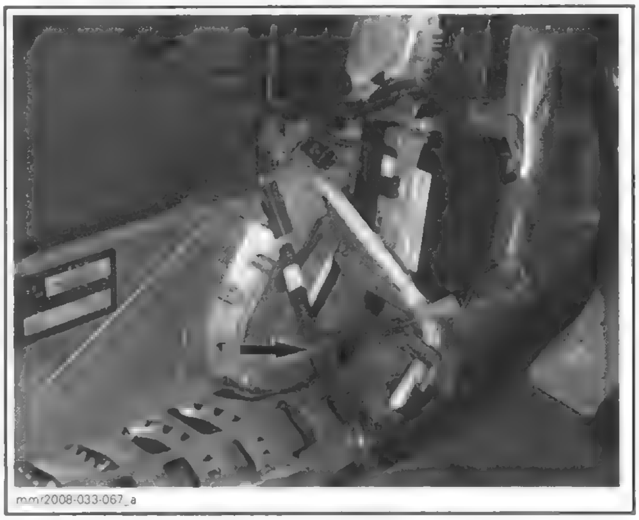
MPI-2 Connections with Vehicle

Remove the 6 pin connector from the protective cap on the right side of the vehicle.


mmr2008-033-065_a

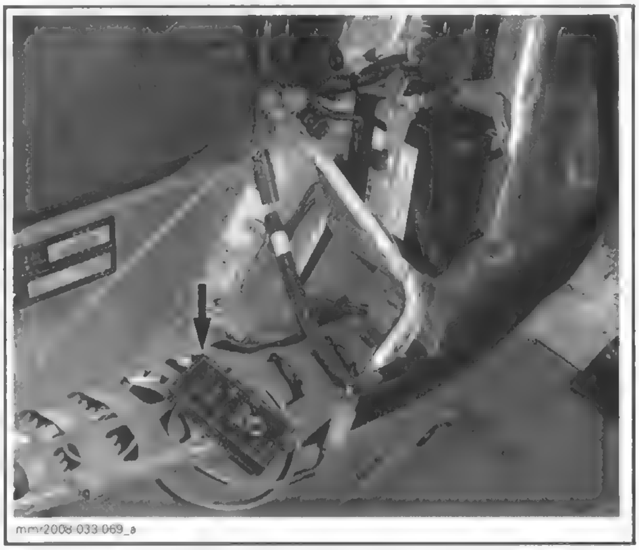

mmr2008-033-066_a

Connect supply T-harness (P/N 529 035 869), to vehicle 6-pin connector.

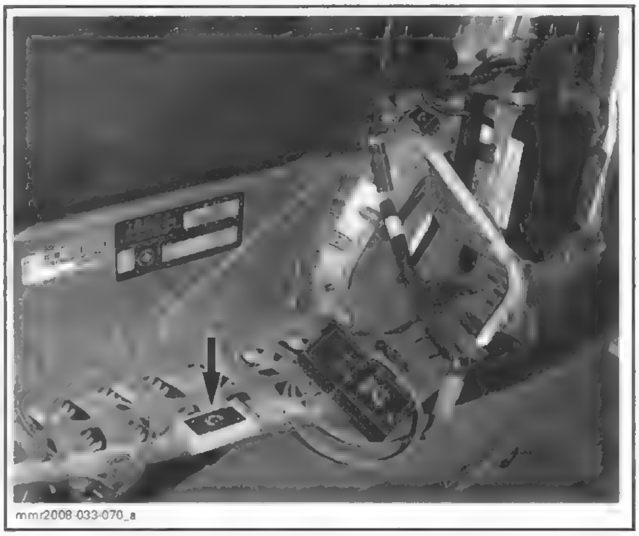

mmr2008-033-067_a

600 HO SDI

Connect DESS post interface (P/N 529 036 019), to supply T-harness connector.


mmr2008-033-069_a

Connect MPI-2 (P/N 529 036 018) to DESS post interface.

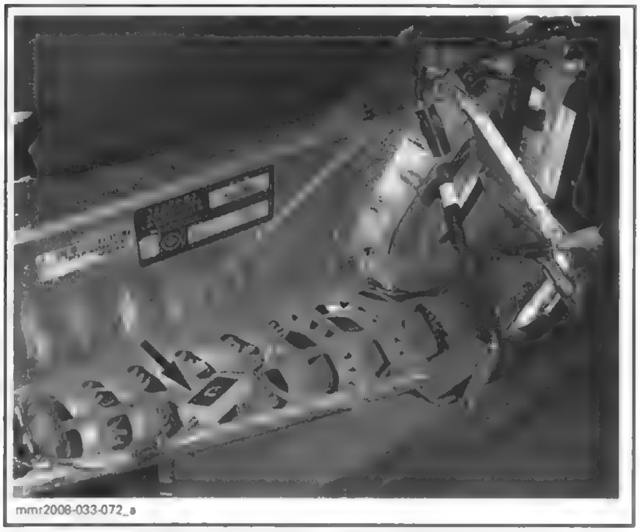

mmr2008-033-070_a

500SS/800R

Connect diagnostic cable (P/N 710 000 851) to supply T-harness connector.

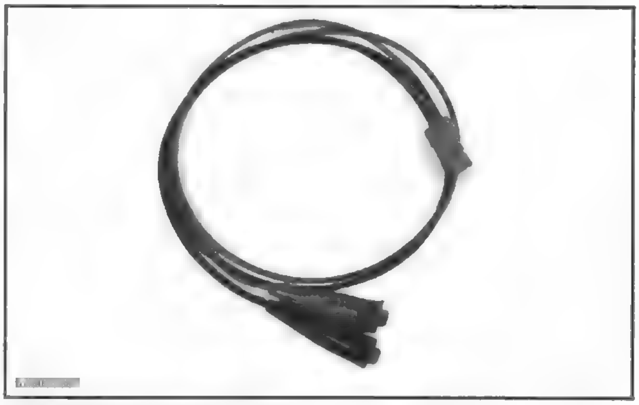
mmr2008-033-071_a

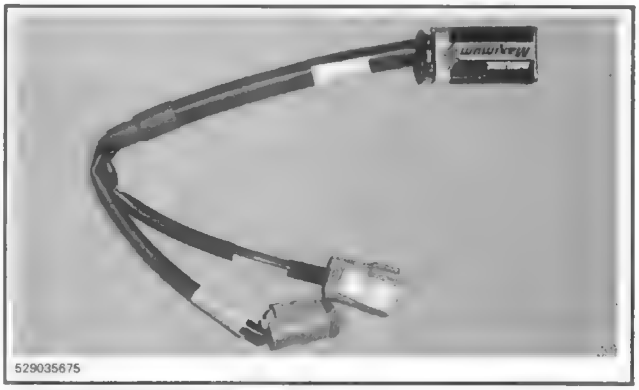
Connect MPI-2 (P/N 529 036 018) to diagnostic cable.


mmr2008-033-072_a

CAUTION: Connecting MPI-2 directly to vehicle connector (without supply T-harness) may prevent proper communication. Always use the proper supply T-harness.

Connect supply T-harness to a 12 V battery, using 12 V battery supply cable (P/N 529 035 997); or to a 9 V battery, using 9 V battery supply cable (P/N 529 035 675).


12 V BATTERY SUPPLY CABLE


529035675

9 V BATTERY SUPPLY CABLE

NOTE: The 9 V battery allows programming keys, setting ignition timing, reset closed throttle, etc. The 12 V battery allows to activate solenoids, spark plugs, etc., from B.U.D.S. **Activation** tab. In this case, all sensors and actuators will be continuously supplied from the battery. The ECM will switch the circuit to the ground when activated through B.U.D.S. If engine starting is required, disconnect clips from battery.

600 HO SDI

These models do not need any external 9 V or 12 V power to allow programming and troubleshooting. The use of the supply T-harness will keep the ECM ON. Not using it will make the ECM shuts-off after a few seconds.

All Models

CAUTION: Always use the proper supply harness and cables. Ensure to respect polarity when connecting cable clips to battery. Match RED cables together.

NOTE (500SS/800R)

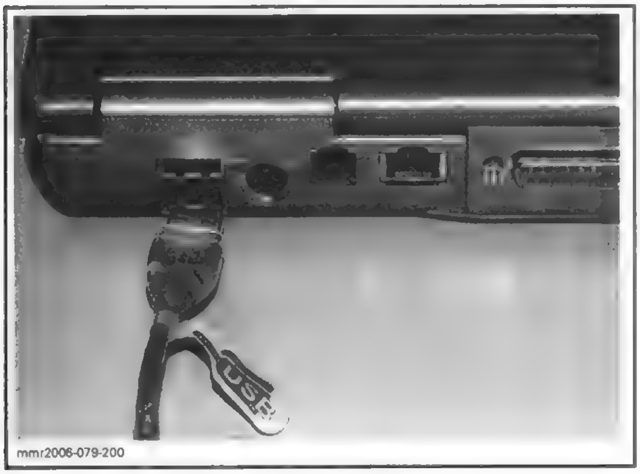
It is suggested to disconnect headlights fuse and to turn off heated grips to reduce battery discharge rate.

On manual start models, it is necessary to use an external 12 V battery and to connect the supply cable clips on it to supply ECM and sensors/actuators.

On electric start models, it is necessary to connect the supply cable clips to the battery to supply ECM and sensors/actuators.

NOTE: Some components will generate heat when leaving vehicle in diagnostic mode for a long period. Always disconnect MPI supply harness and supply cable from vehicle/battery when not working on vehicle.

Connect remaining MPI-2 connector to the USB port of a PC (personal computer).


USB
mmr2006-079-200

B.U.D.S. SOFTWARE

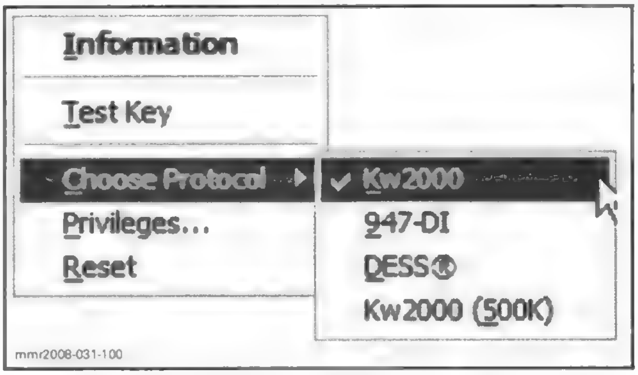
B.U.D.S. (Bombardier Utility and Diagnostic Software) is designed to allow electrical component inspection, diagnostic options and adjustments such as the closed throttle.

For more information pertaining to the use of the B.U.D.S. software, use its help which contains detailed information on its functions.

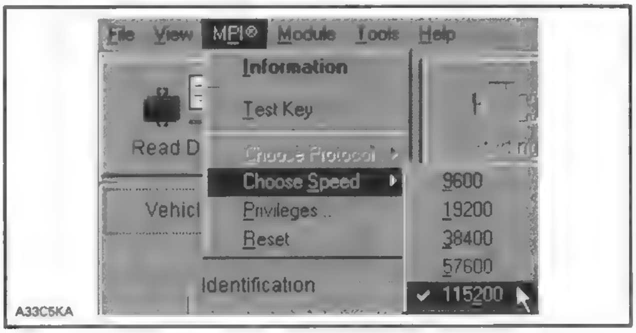
When using the service action suggested in the **Fault** section of B.U.D.S., for instance, a system circuit referred to as DA-35, means connector "A" on the ECM and the contact 35.

When using the B.U.D.S. software:

- Ensure that the protocol "kW2000" is properly selected in **MPI** under **Choose protocol**.


Information
Test Key
Choose Protocol
Privileges...
Reset
✓ Kw2000
947-DI
DESS®
Kw2000 (500K)
mmr2008-031-100

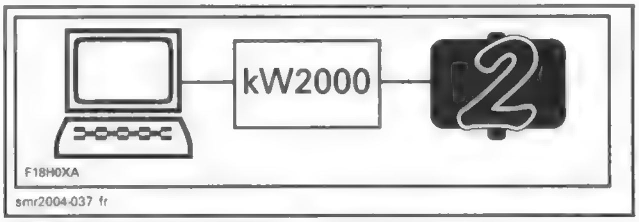
- Ensure that 115200 speed is properly selected in **MPI** under **Choose speed.**


File
View
MPI®
Module
Tools
Help
Information
Test Key
Read D
Choose Protocol
Choose Speed
Vehicl
Privileges ..
Reset
Identification
9600
19200
38400
57600
✓ 115200
A33C5KA

NOTE: If you are using an old PC computer, it may be necessary to use a slower speed so that the communication works.

- Ensure the status bar shows the kW2000 and the number 2 to the right.

Number 2 indicates that the ECM and the multifunction gauge are recognized by the MPI.


kW2000
2
F18H0XA
smr2004-037 fr

CONNECTION SUCCESSFUL

If an "X" is shown, this means that no communication between the MPI and the ECM is possible. In this case possible causes are:

- ECM is not powered-up
- Wrong protocol is used
- Bad connection between MPI and ECM.

When finished, ensure to vehicle harness reconnect in protective cap.

NOTE: There is a 120 Ω resistor in protective cap.

MONITORING SYSTEM/FAULT CODES

MONITORING SYSTEM

The EMS features a monitoring system that self-diagnose its electronic components.

When a predefined condition (engine overheat for example) or a fault occurs, the ECM sends a signal to the multifunction gauge and/or audible signals to a beeper to inform you of this particular condition.

The ECM monitors the following functions and components.

500SS

COMPONENT
DESS
RER
Low oil level
Engine RPM
Hi engine temperature (turns on @ 80°C (176°F) then turns off @ 75°C (167°F)
CAN
ECM
CTS
Main relay

800R

COMPONENT
EMS (TPS, knock sensor, 3D RAVE valve solenoids, DPM, APS and ATS)
DESS
RER
Low oil level
Engine RPM
Hi engine temperature (turns on @ 85°C (185°F) then turns off @ 80°C (176°F)
CAN
ECM
CTS
Main relay

600 HO SDI

COMPONENT
EMS (TPS, CPS, knock sensor, e-RAVE valve solenoids, APS, ATS, EGTS and fuel injectors)
DESS
RER
Low oil level
Engine RPM
Hi engine temperature (turns on @ 95°C (203°F) then turns off @ 90°C (194°F)
CAN
ECM
CTS
Starter solenoid
Fuel pump
All relays

Limp Home Mode

The ECM may automatically set default parameters to ensure the adequate operation of the vehicle if a component of the engine management system is not operating properly.

NOTE: Sensor failures will not lead automatically to a limp home mode. The check engine LED will turn on and in some cases the beeper.

The engine RPM may be limited if some critical components fail. In this case, releasing throttle and letting the engine returning to idle speed may allow normal operation to come back. If it does not work, try removing and reinstalling the tether cord cap on DESS post.

These performance-reduced modes allow the rider to go back home which would not be possible without this advanced system.

Pilot Lamps

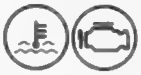
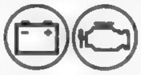
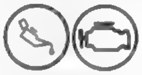
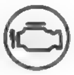
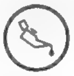
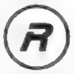
Warning lights in multifunction gauge and/or a beeper provide signals as vehicle operation feedback or to indicate a problem.

Pilot lamp can flash alone or in combination with another lamp.

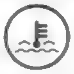
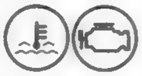
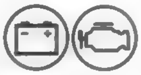
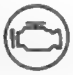
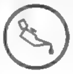
Beeper codes will be heard and messages (depending on gauge model) will be displayed to catch your attention.

NOTE: Message display is not available on all gauges.

500SS/800R

PILOT LAMP(S) ON	BEEPER	MESSAGE DISPLAY	DESCRIPTION
	Fast short beeps	ENGINE	Engine is overheating.
	4 short beeps every 2 minutes	LOW BAT	Indicate a low or high battery voltage condition.
		HIGH BAT	
	Fast short beeps	LOW OIL	Critical low injection oil level.
	4 short beeps	CHECK ENGINE	Engine fault.
	4 short beeps every 2 minutes	KNOCK	– Ensure recommended fuel is used. – Check fuel quality, replace if necessary.
	Continuously beeps	SHUTDOWN	Shutdown procedure in force due to engine overheating problem.
	4 short beeps every 2 minutes	LOW OIL	Injection oil level is low.
	Slow long beeps	REVERSE	Electronic reverse is selected.
	3 short beeps	REV. FAIL	Engine rotation did not change after reverse try, try again.
DESS	Refer to *DESS WARNING SIGNALS* below.		

600 HO SDI

PILOT LAMP(S) ON OR FLASHING	BEEPER	MESSAGE DISPLAY	DESCRIPTION
	4 short beeps	ENGINE or MUFFLER	Engine or muffler is overheating.
	Fast short beeps repetitive	ENGINE	Engine is overheating.
	4 short beeps every 2 minutes	LOW BAT	Indicate a low or high battery voltage condition.
		HIGH BAT	
	4 short beeps	CHECK ENGINE	Engine management fault.
	4 short beeps every 2 minutes	KNOCK	– Ensure recommended fuel is used. – Check fuel quality, replace if necessary.
	3 short beeps	DRW MODE	Engine is in drown mode. Fuel injection and ignition are cut.
	4 short beeps every 2 minutes	LOW OIL	Injection oil level is low.
DESS	Refer to *DIGITALLY ENCODED SECURITY SYSTEM (DESS)* section.		

FAULT CODES

A fault code is an indication that a glitch or malfunction is detected by the monitoring system of the vehicle.

When there is a problem, the EMS (engine management system) can provide fault codes to ease the troubleshooting.

The faults registered in the ECM (engine control module) are kept when the battery is disconnected.

Many fault codes at the same time is likely to be burnt fuse(s) or a faulty relay.

How to Read Fault Codes Using B.U.D.S. Software

Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* section.

For more information pertaining to the faults code status and report, refer to B.U.D.S. online help or to the EMS fault code tables.

How to Read Fault Codes on the Premium Multifunction Gauge

Fault codes can also be displayed in the premium multifunction gauge. Refer to *LIGHTS, GAUGE AND ACCESSORIES*.

SPECIFIC FAULT CODES

The following gives additional information related to specific fault codes.

Fault Code P0336

This code occurs when engine RPM goes too high which could happen under some mechanical-related circumstances and is not necessarily related to a problem with the engine management system.

Fault Code P1102 (TPS offset out of range)

800R

POSSIBLE CAUSE	ACTION TO PERFORM
Wrong carburetor mechanical position during reset of closed TPS.	– Check cable adjustment. – Check idle stop for wear. – Make sure throttle plate is against throttle stop. – Reset **Closed Throttle**. – Adjust idle throttle angle as specified. – Make sure the TPS body is not loose.
No initialisation of ECM after its replacement.	
TPS sensor has moved from its original position.	

Fault Code P1104 (TPS offset not programmed)

800R

POSSIBLE CAUSE	ACTION TO PERFORM
No initialisation of ECM after its replacement.	Reset **Closed Throttle**.

TPS (Throttle Position Sensor) Faults

600 HO SDI

TPS Faults which are reported in B.U.D.S. fall into two groups; out of range and adaptation failure faults.

TPS "OUT OF RANGE" Fault

It is caused by the sensor reading going out of its allowable range. This fault can occur during the whole range of movement of the throttle.

To diagnose this fully, it is recommended to operate the throttle through its full range. It is also recommended to release the throttle quickly as this may also reveal a fault that is intermittent.

POSSIBLE CAUSES	ACTION
Check if connector is disconnected from TPS	Reconnect.
Check if sensor is loose	Tighten sensor and reset **Closed Throttle**.
Inspect sensor for damage or corrosion	Replace sensor and reset **Closed Throttle**.
Inspect wiring (voltage test)	Repair.
Inspect wiring and sensor (resistance test)	If bad wiring, repair. If bad TPS, replace and reset **Closed Throttle**.
Test sensor operation (wear test)	Replace sensor and reset **Closed Throttle**.

TPS "ADAPTATION FAILURE" Fault

It is caused by the idle position moving out of an acceptable range.

Following problems can be caused by a TPS "Adaptation Failure":

- Idle speed is out of range.
- Engine stops, when throttle is released quickly.
- Engine runs inconsistent in low partload or low RPM.

POSSIBLE CAUSES	ACTION
Sensor has been replaced and TPS closed position not reset	Reset **Closed Throttle**.
Throttle body has been replaced and TPS closed position not reset	Reset **Closed Throttle**.
ECM has been replaced and TPS closed position not reset	Reset **Closed Throttle**.
Throttle cable too tight	Adjust cable and reset **Closed Throttle**.
Sensor is loose	Tighten sensor and reset **Closed Throttle**.
Throttle bracket is loose	Fix and reset **Closed Throttle**.
Adjustment screw worn or loose	Adjust idle speed screw using B.U.D.S.

FAULT CODE TABLES

IMPORTANT: After a problem has been solved, ensure to clear the fault(s) in the ECM using the B.U.D.S. software. This will properly reset their states.

500SS/800R

FAULT CODE	DESCRIPTION
P0079	RAVE solenoid 1 output fault (open circuit/shorted to ground)
P0080	RAVE solenoid 1 output fault (shorted to battery)
P0085	RAVE solenoid 2 output fault (open circuit/shorted to ground)
P0086	RAVE solenoid 2 output fault (shorted to battery)
P0107	Air Pressure Sensor fault (voltage too low)
P0108	Air Pressure Sensor fault (voltage too high)
P0112	Air Temperature Sensor fault (voltage too low)
P0113	Air Temperature Sensor fault (voltage too high)
P0117	Engine Temperature Sensor fault (voltage too low)
P0118	Engine Temperature Sensor fault (voltage too high)
P0122	Throttle Position Sensor fault (voltage too low)
P0123	Throttle Position Sensor fault (voltage too high)
P0326	Knock sensor reference signal fault (voltage too low)
P0336	High engine RPM detected
P0605	System fault (Calibration checksum error)
P1102	System fault (Throttle Position Sensor offset out of range)
P1104	System fault (Throttle Position Sensor offset not programmed)
P1217	Overheat shutdown occurred
P1261	HAC solenoid output fault (open circuit/shorted to ground)
P1262	HAC solenoid output fault (shorted to battery)
P1656	DESS communication link fault (shorted to ground)
P1675	Relay output fault (open circuit/shorted to ground)
P1676	Relay output fault (shorted to battery)
P1520	Critical low oil level detected
P0217	Critical engine temperature detected
P1326	Critical detonation level detected
P0600	CAN Message Missing

600 HO SDI

FAULT CODE	DESCRIPTION
P0117	Engine temperature sensor voltage too low
P0118	Engine temperature sensor voltage too high
P0116	Engine temperature sensor functional problem
P0112	Air temperature sensor voltage too low
P0113	Air temperature sensor voltage too high
P0111	Air temperature sensor functional problem
P0562	Battery voltage too low
P0563	Battery voltage too high
P0336	High engine RPM detected
P0339	Crankshaft signal fault
P0427	Exhaust temperature sensor voltage too low
P0428	Exhaust temperature sensor voltage too high
P0426	Exhaust temperature sensor functional problem
P0107	Air pressure sensor voltage too low
P0108	Air pressure sensor voltage too high
P0608	Sensor's power supply voltage too low
P0608	Sensor's power supply voltage too low
P0232	Fuel pump shorted to battery
P0231	Fuel pump open circuit or shorted to ground
P0617	Starter relay shorted to battery
P0616	Starter relay open circuit or shorted to ground
P0080	RAVE selenoid shorted to battery
P0079	RAVE selenoid open circuit or shorted to ground
P1675	Relay 2 shorted to battery
P1676	Relay 2 open circuit or shorted to ground
P0326	Knock sensor below minimum noise
P1502	TOPS functional problem
P0351	No Ignition Output Cylinder #1 (MAG for 2 cyl. Engine)
P0352	No Ignition Output Cylinder #2 (PTO for 2 cyl. Engine)
P0262	Injector Cyl. #1 OR Outer MAG injector (2 cyl.), shorted to battery
P0261	Injector Cyl. #1 OR Outer MAG injector (2 cyl.), open circuit or shorted to ground
P0265	Injector Cyl. #2 OR Outer PTO injector (2 cyl.), shorted to battery
P0264	Injector Cyl. #2 OR Outer PTO injector (2 cyl.), open circuit or shorted to ground
P0268	Injector Cyl. #3 OR Inner MAG injector (2 cyl.), shorted to battery
P0267	Injector Cyl. #3 OR Inner MAG injector (2 cyl.), open circuit or shorted to ground
P0271	Inner PTO injector shorted to battery

FAULT CODE	DESCRIPTION
P0270	Inner PTO injector open circuit or shorted to ground
P0122	Throttle position sensor voltage too low
P0123	Throttle position sensor voltage too high
P0601	Module call monitoring
P1102	Throttle position sensor adaptation failure
P1104	Throttle position sensor adaptation canceled
P1148	Safety fuel cut off detected
P1655	DESS shorted to battery
P1656	DESS line shorted to ground
P0604	RAM fault
P0605	EEPROM fault
P0601	Module call monitoring
P0602	MPEM not coded
P0605	EEPROM fault
P1549	Very high exhaust temperature detecte

FUEL TANK/FUEL PUMP

SERVICE TOOLS

Description	Part Number	Page
pliers Oetiker 1099	295 000 070	218
small hose pincher	295 000 076	202, 204, 216
vacuum/pressure pump	529 021 800	202–203
pressure gauge	529 035 709	204
Fluke 111 multimeter	529 035 868	205
pressure test fuel cap	529 035 870	202
fuel tank nut wrench	529 035 891	214
T-fitting	529 036 023	204
fuel pump nut tool	529 036 118	207, 210

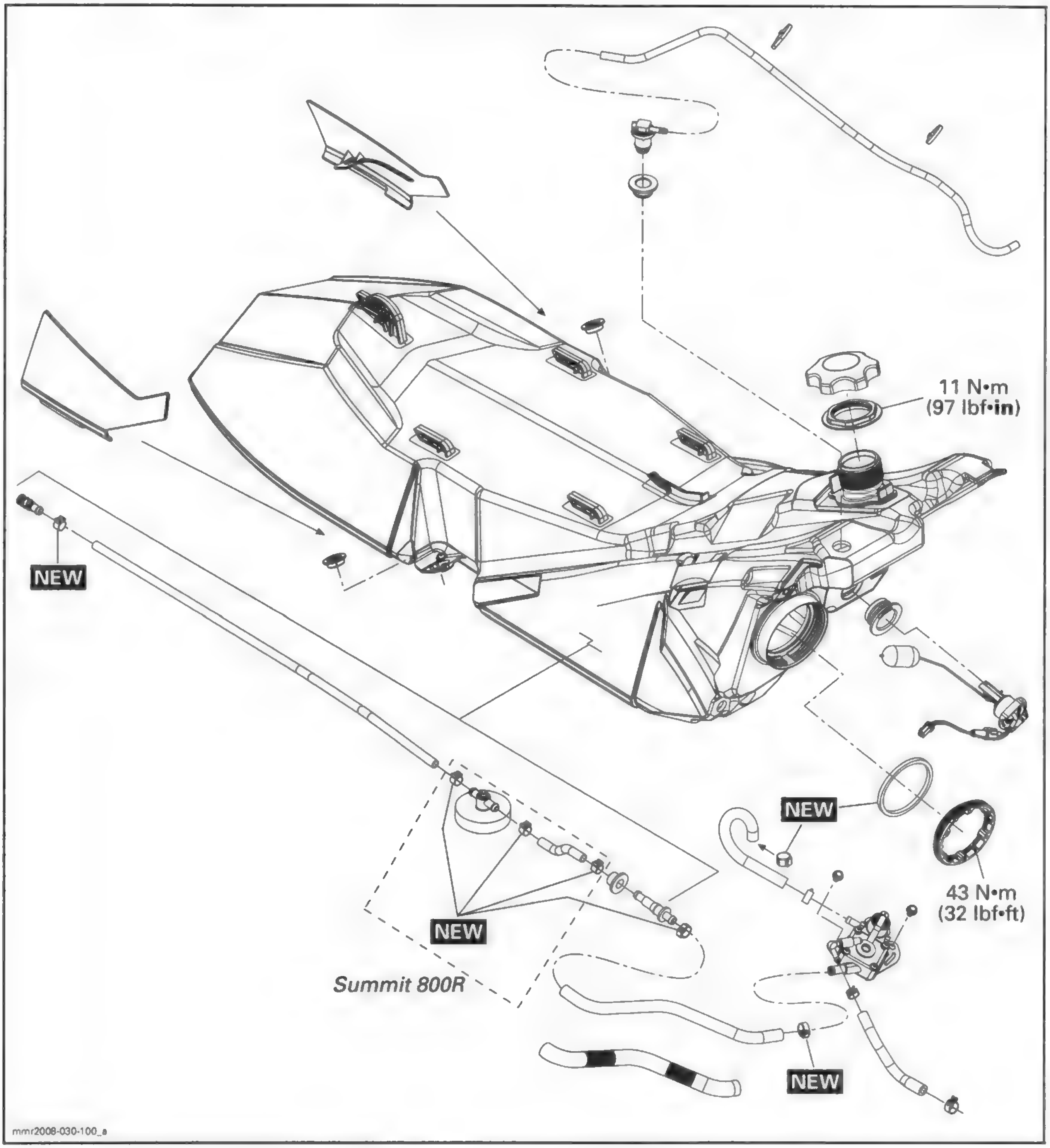
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
Fluke rigid back probes	TP88	205

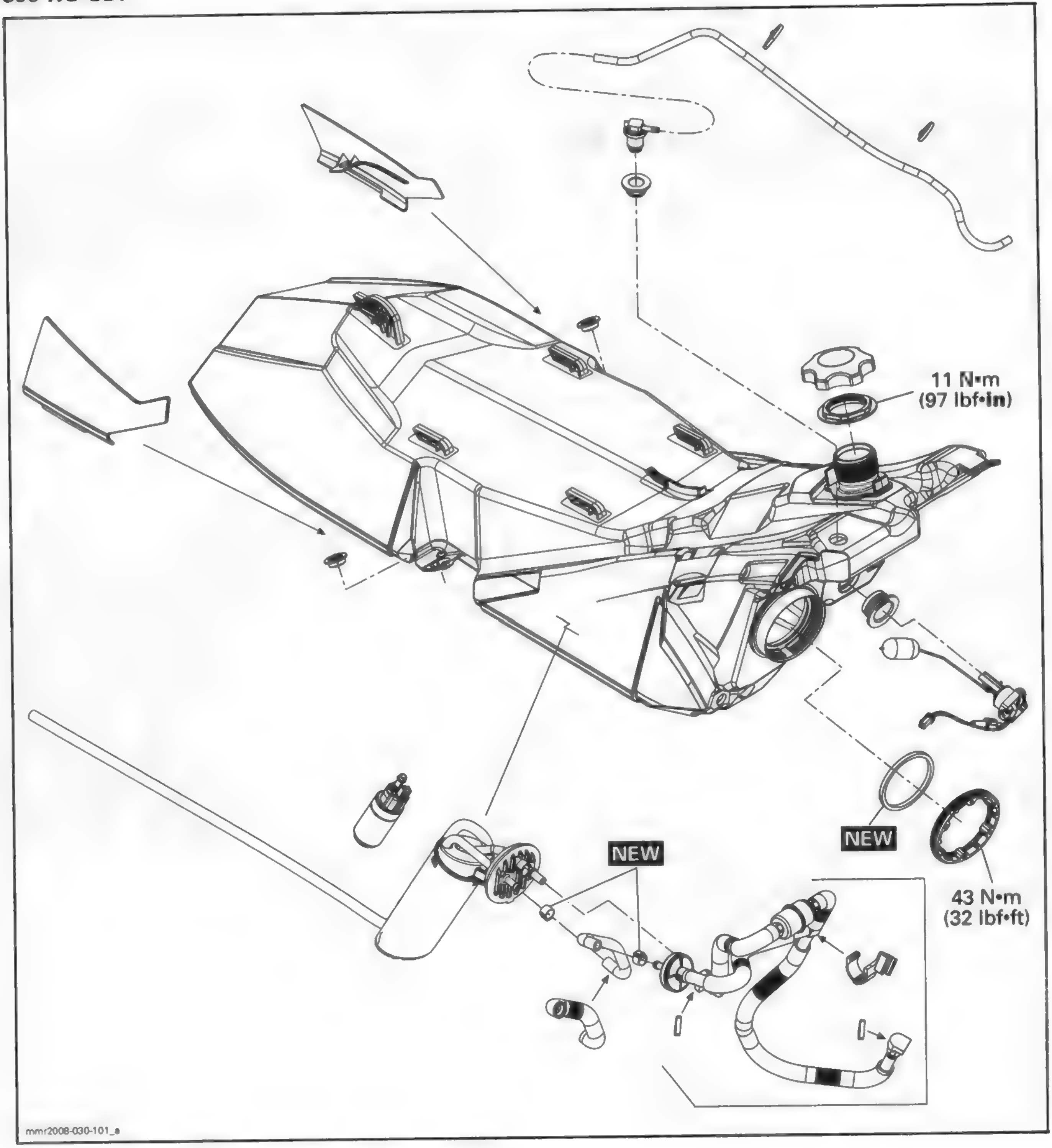
SERVICE PRODUCTS

Description	Part Number	Page
dielectric grease	293 550 004	214

500SS/800R


11 N•m
(97 lbf•in)
NEW
NEW
43 N•m
(32 lbf•ft)
NEW
Summit 800R
NEW
mmr2008-030-100_a

600 HO SDI


11 N•m
(97 lbf•in)
NEW
NEW
43 N•m
(32 lbf•ft)
mmr2008-030-101_a

GENERAL

NOTE: On applicable models, it is a good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to *MONITORING SYSTEM/FAULT CODES*.

> **⚠ WARNING**
>
> **Fuel lines remain under pressure at all times. Always proceed with care and use appropriate safety equipment when working on pressurized fuel system. Wear safety glasses and work in a well ventilated area. Proceed with care when removing/installing high pressure test equipment or disconnecting fuel line connections. Use the B.U.D.S. software to release fuel pressure prior to removing a hose. Cover the fuel line connection with an absorbent shop rag. Slowly disconnect the fuel hose to minimize spilling. Do not allow fuel to spill on hot engine parts and/or on electrical connectors. Wipe off any fuel spillage in the engine compartment. Fuel is flammable and explosive under certain conditions. Always disconnect battery prior to working on the fuel system. After working on the fuel system, carry out a fuel system pressurization. Failure to carry out a fuel system leak test could result in severe injury or a life threatening situation should a leak occur.**

INSPECTION

FUEL SYSTEM PRESSURIZATION

Fill up fuel tank.

Open the left side panel to access the fuel vent line.

Install a small hose pincher (P/N 295 000 076) on the vent line.

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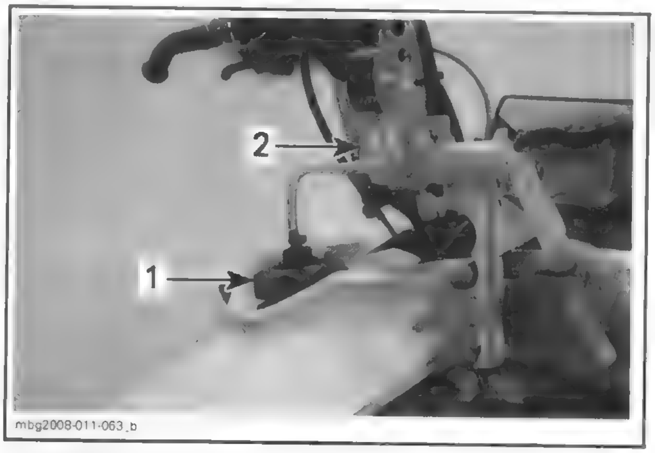
HOSE PINCHER ON FUEL VENT LINE

On **500SS** and **800R** models, also install a hose pincher on the carburetor fuel feed line.

Install a pressure test fuel cap (P/N 529 035 870) on fuel tank inlet.

Install vacuum/pressure pump (P/N 529 021 800) on pressure test fuel cap.



1. *Pressure test fuel cap*
2. *Vacuum/pressure pump*

Set pump selector to **pressure**.

Pressurize fuel tank as follows.

PRESSURE	TIME WITHOUT PRESSURE DROP
21 kPa (3 PSI)	3 minutes

If pressure drops, locate fuel leak(s) and repair/replace leaking component(s).

To ease locating leak(s), spray soapy water on components; bubbles will indicate leak location(s).

Fuel Tank Check Valve Test

Check Valve Operation

The check valve on the fuel tank vent is a combination type valve, it acts as both a check valve and a pressure relief valve.

Air can enter the fuel tank at all times through the check valve. As fuel is consumed by the engine, a negative press would occur in the fuel tank. This could eventually prevent the engine from receiving proper fuel press. The check valve prevents this as the **negative pressure relieve function** of the valve opens the valve and allows outside air pressure in.

If pressure in the fuel tank builds up and exceeds 2.0 to 4.8 kPa (.3 to .7 PSI), the **positive pressure relief function** opens the valve and lets excess pressure out of the tank.

The **check valve** also prevents fuel from flowing out of the fuel tank.

Check Valve Test

While the fuel tank is still pressurized as in the previous test, carry out the following:

Place a finger over the vent hose outlet.

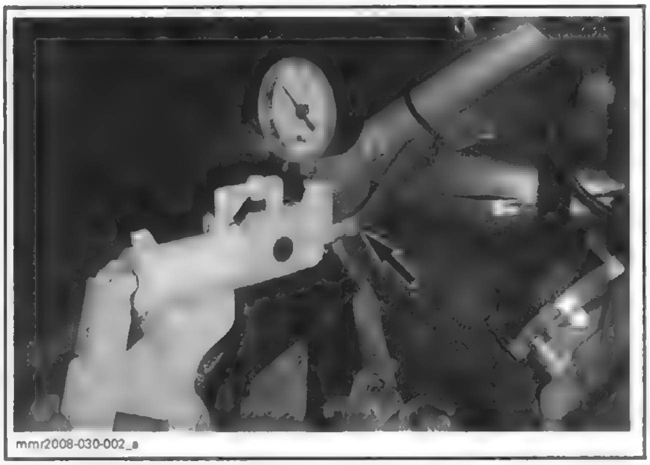
When removing hose pincher, alternately touch and release vent hose outlet. You should feel pressurized air flowing out indicating the pressure relief valve function is working.

Release any remaining pressure in the fuel tank by slowly unscrewing fuel tank cap.

Remove the pressure test fuel cap (P/N 529 021 800).

Remove the fuel tank vent line from its fitting on the lower left front body panel.

Install the vacuum/pressure pump (P/N 529 021 800) on the vent line and apply air pressure through check valve. Air must flow freely towards the fuel tank neck.



VACUUM/PRESSURE PUMP ON VENT LINE

NOTE: If fuel vent check valve does not function as indicated in test, replace check valve.

Remove vacuum/pressure pump.

Install vent line on its fitting.

Install normal fuel tank cap.

HIGH PRESSURE LEAK TEST (electric fuel pump circuit)

600 HO SDI

Install DESS cap on DESS post. Push the engine cut-out switch to OFF position. Press on the start button to activate fuel pump.

Check for any leakage at fuel rail, injectors, in-line fuel filter, in-line fuel pressure regulator, and fuel hoses.

FUEL PUMP PRESSURE TEST

600 HO SDI

The pressure test will show the available pressure at the fuel pump outlet. It validates the pressure regulator and the fuel pump.

Ensure there is no fuel leaking from hoses and fittings. Repair any leak.

Ensure there is enough gas in fuel tank.

Before carrying out the fuel pump pressure test, ensure the battery is fully charged. Battery voltage must be over 12 volts.

Refer to the *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* section.

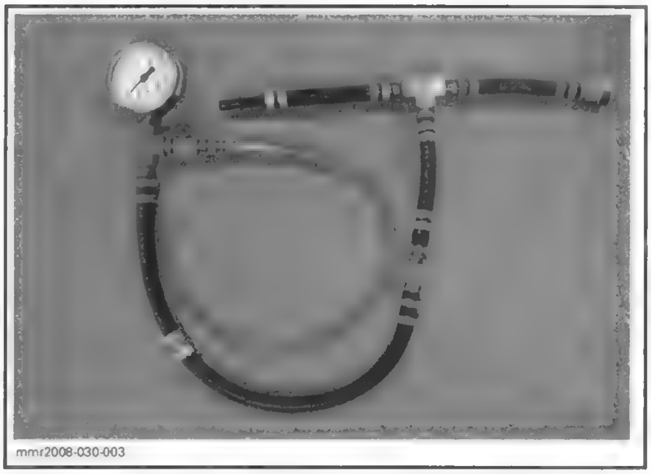
Release the fuel pressure in the system using B.U.D.S., refer to the **Activation** tab.

Remove the primary air inlet silencer.

Disconnect the throttle body assembly from the air adapters.

Disconnect the fuel pump pressure hose at the fuel rail.

Install the fuel T-fitting (P/N 529 036 023) and pressure gauge (P/N 529 035 709) between disconnected hoses (in-line installation).



PRESSURE GAUGE WITH "T" FITTING ADAPTER

Remove the DESS cap. Depress the START/RER button and observe fuel pressure. **Do not crank engine.** Repeat twice. Release pressure using B.U.D.S. between tests so that the gauge is "reset" to zero (0).

FUEL PRESSURE (when depressing START/RER button)
400 kPa (58 PSI)

mmr2008-030-004

FUEL PUMP PRESSURE TEST

Crank engine in flooded mode (throttle full open) and observe fuel pressure. The fuel pressure should be the same as above.

If pressure is within limits, fuel pump and pressure regulator are working correctly.

NOTE: If pressure is not adequate, refer to *FUEL DELIVERY DIAGNOSTIC FLOW CHART* in the *TROUBLESHOOTING* section.

A rapid pressure drop indicates leakage either from the fuel rail or from the fuel pump check valve. Check fuel rail for leaks. If it is not leaking then replace fuel pump.

A slow pressure drop indicates leakage either from the fuel injector or from the fuel pressure regulator. Check fuel injector for leaks (see below). If it is not leaking then replace fuel pressure regulator.

Release fuel pressure using B.U.D.S.

Bleed away any remaining fuel in the pressure gauge and T-fitting adapter.

Remove pressure gauge and T-fitting.

Reinstall fuel hose.

Carry out a high pressure leak test, refer to *HIGH PRESSURE LEAK TEST (ELECTRIC FUEL PUMP CIRCUIT)* in this section.

Reinstall removed parts.

PROCEDURES

DIAPHRAGM FUEL PUMP

500SS/800R

Fuel Pump Verification

Check fuel pump valves operation as follows:

Empty fuel tank.

NOTE: For the following test, ensure hoses have a tight fit.

Disconnect outlet hose from fuel tank.

Alternately apply pressure and vacuum with pump from leak test kit to disconnected hose. The inlet valve should release with pressure and hold under vacuum.

Disconnect inlet hose from carburetor.

Repeat the same procedure to disconnected hose. This time the outlet valve should hold with pressure and release under vacuum.

Fuel Pump Removal

Remove the primary air intake silencer.

NOTE: Do not disconnect cables from carburetors.

On **800R** models, disconnect the TPS connector.

Install a small hose pincher (P/N 295 000 076) on the fuel supply line close to pump inlet.

Remove the Norma spring clamp and disconnect the carburetors fuel supply line at fuel pump outlet. Use a rag and a container to contain fuel flowing from the disconnected hose.

Install larger pinchers on the carburetor(s) coolant lines.

Remove Norma spring clamp and disconnect the impulse (vacuum) line at fuel pump.

Disconnect carburetors from engine and move them aside for access to the fuel pump.

Remove screws securing fuel pump to chassis.

Fuel Pump Installation

Reverse the removal procedure.

Carry out a fuel system pressurization test to ensure there isn't a leak in the fuel system.

ELECTRIC FUEL PUMP

600 HO SDI

Fuel Pump Quick Test

Remove key from post.

Set RUN/STOP switch to STOP.

Press the START/RER button.

You should obtain the following results:

- Multifunction gauge should come "ON", then go off after about 5 seconds.
- The electric fuel pump should function briefly.

If the fuel pump is functioning, check the fuel pressure. Refer to *FUEL PUMP PRESSURE TEST.*

If the fuel pump is not functioning, but the multifunction gauge functions, carry out a fuel pump input voltage test.

Fuel Pump Test With B.U.D.S.

Connect B.U.D.S. Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE.*

In B.U.D.S., select the **Activation** tab, then the **Fuel Pump** activation button.

Listen for fuel pump operation.

If you did not here the pump come "ON", select the **FAULTS** tab and check for fault codes.

Repair or replace pump, wiring or connections as required.

Fuel Pump Input Voltage Test

Remove back panel of starter rewind handle.

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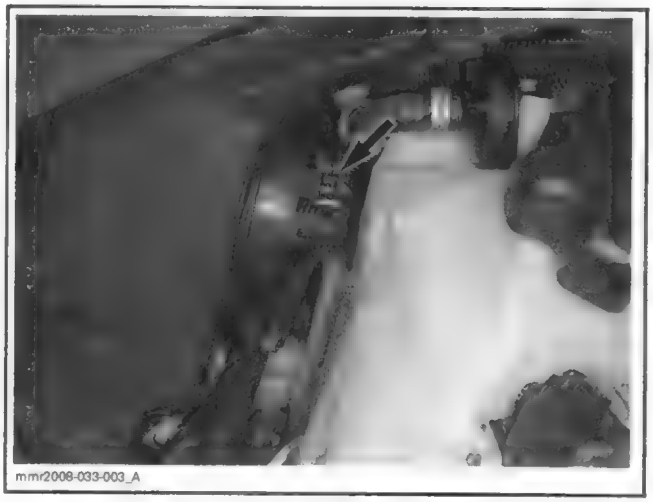
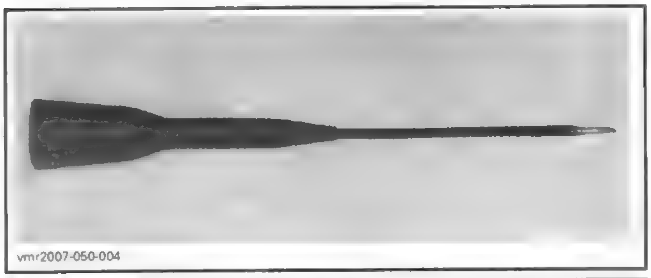
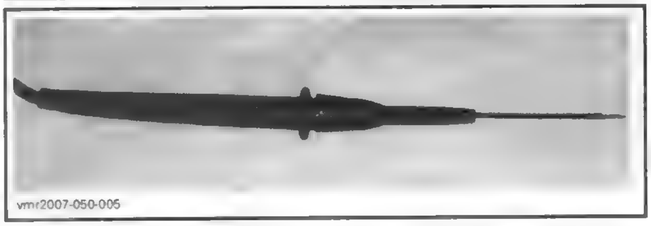
Disconnect fuel pump connector.



To perform test, use the Fluke 111 multimeter (P/N 529 035 868).

To probe female wire terminals, use the Fluke rigid back probes (P/N TP88) or equivalent. They can be inserted at the end of the standard probes of the Fluke 111 multimeter.





NOTE: Removing the red plastic pin lock on the front of the connector will ease access to pins.

CAUTION: Probes are round and terminals are rectangular. Do not force probes into female terminals as this could enlarge or damage terminals resulting in a pour connection.

Set multimeter to Vdc.

Remove DESS cap from DESS post.

Set RUN/STOP switch to STOP.

As you gently hold both probes in the ends of the terminals, have someone else press the START/RER button.

Read pump input voltage. You should read battery voltage (approximately 12.8 Vdc).

If you did not read battery voltage, check fuse F5. If fuse is in good condition, carry out a continuity check of the circuit. Refer to the *WIRING DIAGRAM*.

Reinstall plastic pin lock.

Install connector on fuel pump.

Install remaining parts in reverse order of removal.

Fuel Pump Pressure Test

Refer to *INSPECTION* in this section.

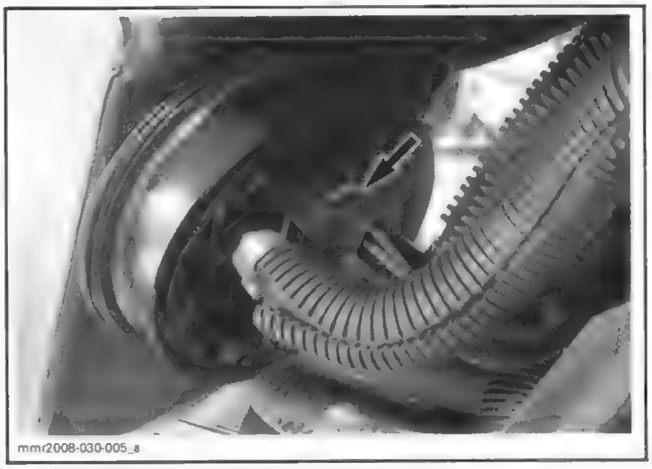
Fuel Pump Removal

Use B.U.D.S. to release fuel pressure. Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* section.

Drain fuel tank as much as possible.

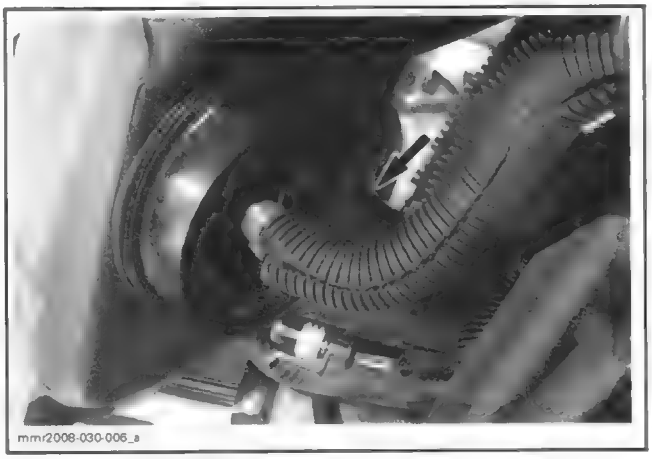
Follow procedures for removing fuel tank and move fuel tank back for access to fuel pump, refer to *FUEL TANK REMOVAL* in this section.

Disconnect fuel pump electrical connector.



DISCONNECT FUEL PUMP CONNECTOR

Disconnect fuel supply hose from fuel pump assembly at quick disconnect.

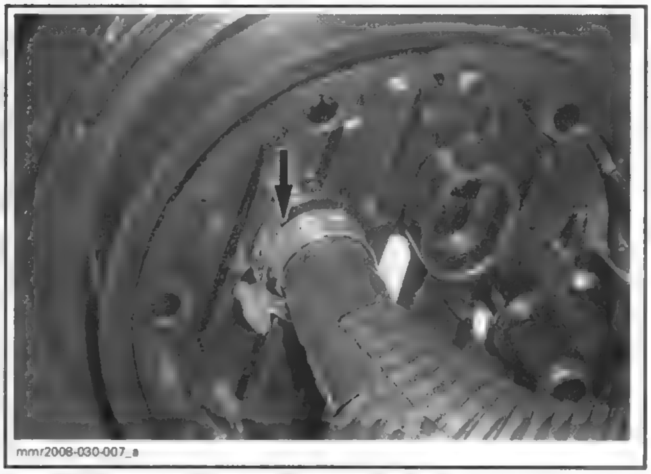


DISCONNECT FUEL SUPPLY LINE

NOTE: Always wipe off all fuel which drained from fuel line, or fuel pump.

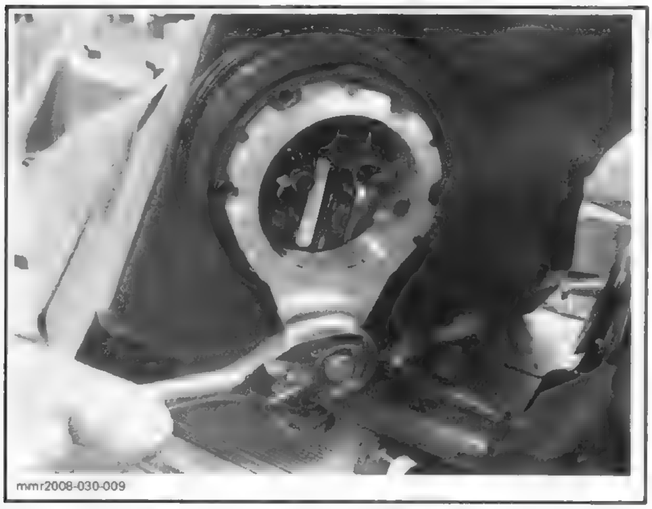
Unhook Oetiker clamp on the fuel regulator return hose to fuel pump.

Put a rag over the pressure regulator fitting and remove regulator return hose from pump.

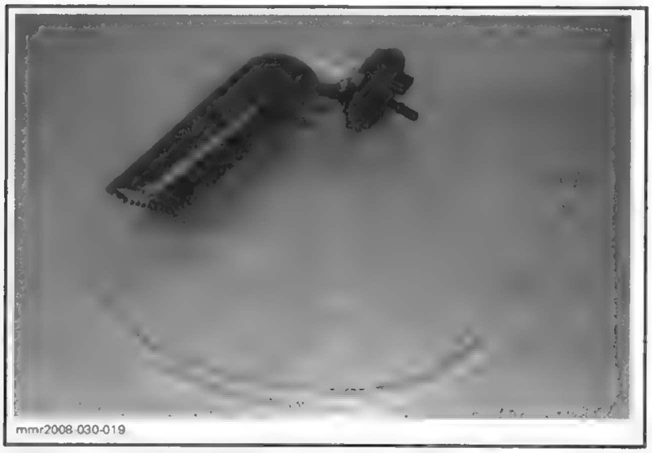


UNHOOK OETIKER CLAMP, REMOVE HOSE

Using fuel pump nut tool (P/N 529 036 118), remove fuel pump spanner nut.



Remove fuel pump assembly from fuel tank.



TYPICAL – ELECTRIC FUEL PUMP ASSEMBLY

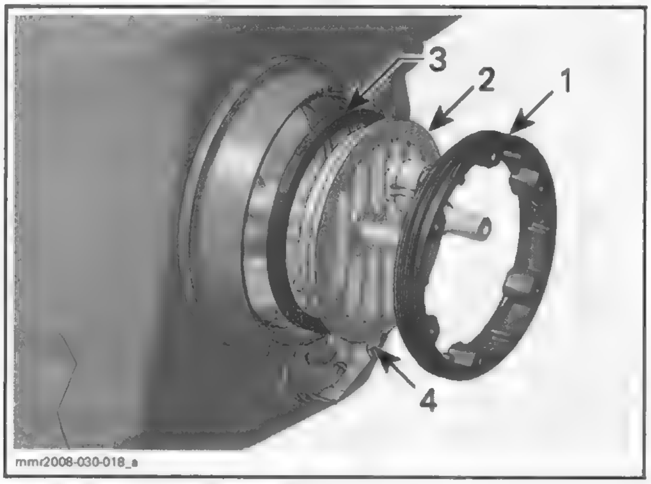
Remove and discard fuel pump gasket.

Fuel Pump Installation

For installation, reverse the removal procedure but pay attention to the following.

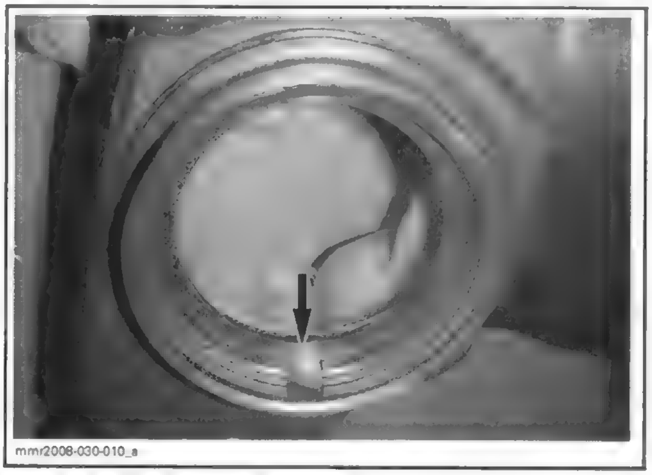
Install a new gasket on the fuel pump prior to installing the pump in the tank.

NOTE: The gasket must be installed on the fuel tank side so it is located between the pump and the fuel tank.



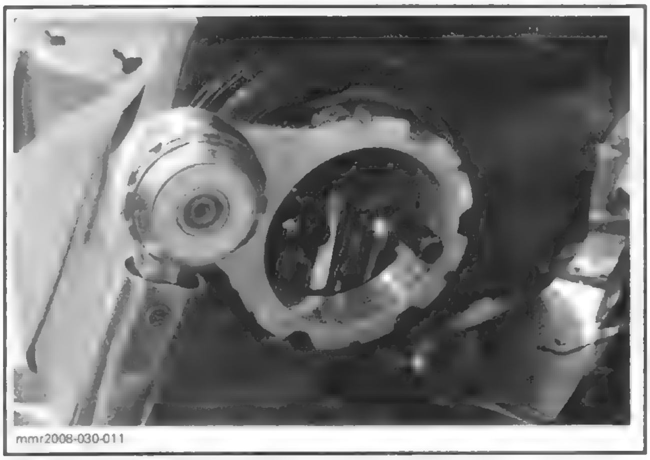
FUEL PUMP INSTALLATION
1. *Fuel pump spanner nut*
2. *Fuel pump face plate*
3. *Fuel pump gasket*
4. *Pump alignment tab*

Protruding tab on the lower portion of fuel pump face plate must engage in fuel tank pump alignment keyway.



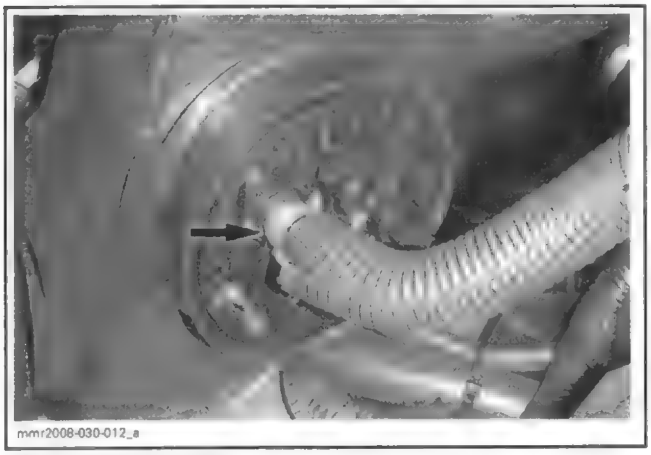
FUEL PUMP ALIGNMENT KEYWAY

Install a torque wrench perpendicularly (90°) to fuel pump nut wrench (P/N 529 036 118). Torque fuel pump spanner nut to 43 N•m (32 lbf•ft).



TORQUE WRENCH AT 90°

Use a new clamp to secure pressure regulator return hose to fuel pump fitting.



NEW OETIKER CLAMP

Carry out a fuel system leak test and a high pressure leak test, refer to *FUEL SYSTEM PRESSURIZATION* and *HIGH PRESSURE LEAK TEST (ELECTRIC FUEL PUMP CIRCUIT)* in this section.

CAUTION: Ensure hose clamps are tight and that hoses cannot turn on their fittings.

FUEL PRESSURE REGULATOR

600 HO SDI

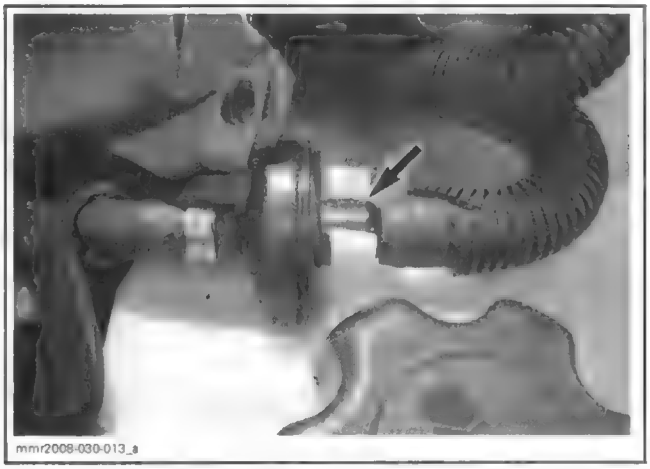
The fuel pressure regulator is an in-line type and comes as an assembly with the fuel filter, fuel pump outlet pressure hose and regulator return hose.

Fuel Pressure Regulator Removal

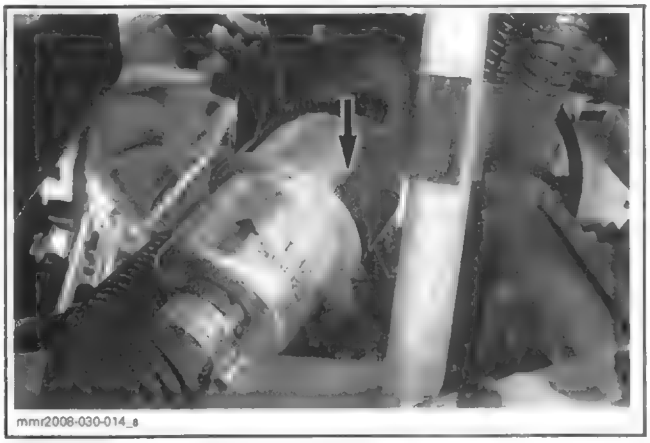
Use B.U.D.S. to release fuel pressure. Refer to the *COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE* section.

Obtain access to fuel tank disconnects, refer to *FUEL TANK REMOVAL* in this section.

Remove fuel pressure regulator from holder on oil tank.



REMOVE FROM HOLDER



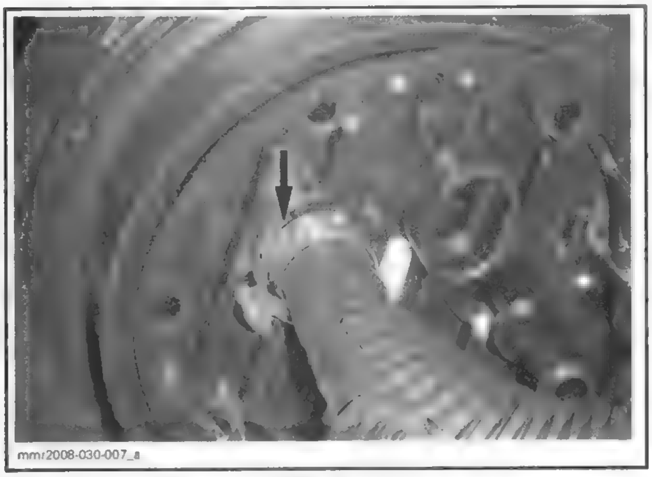
REMOVE FROM CLIP

Remove fuel filter from retaining clip.

Move fuel tank backwards enough to access fuel tank disconnects.

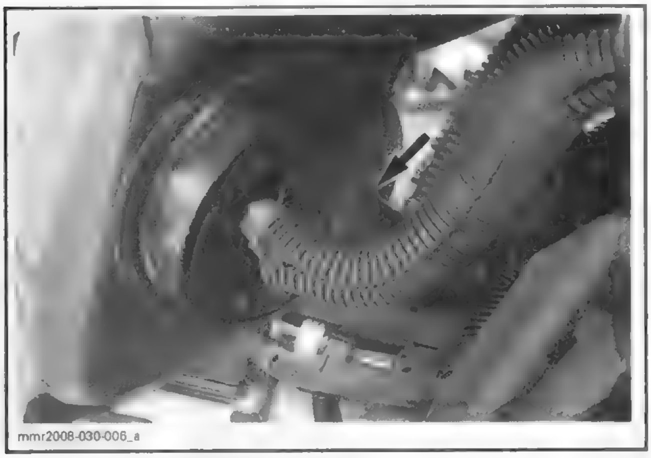
Unhook and remove Oetiker clamp on the fuel regulator return hose (to fuel pump).

Place a rag over the pressure regulator return hose fitting, and remove the regulator hose from the fuel pump.



UNHOOK OETIKER CLAMP, REMOVE HOSE

Place a rag over the fuel pump supply line quick disconnect, release the locking clip, and disconnect it from the pump.



DISCONNECT FUEL SUPPLY LINE

Remove primary air intake silencer.

Disconnect throttle body assembly from air adapters.

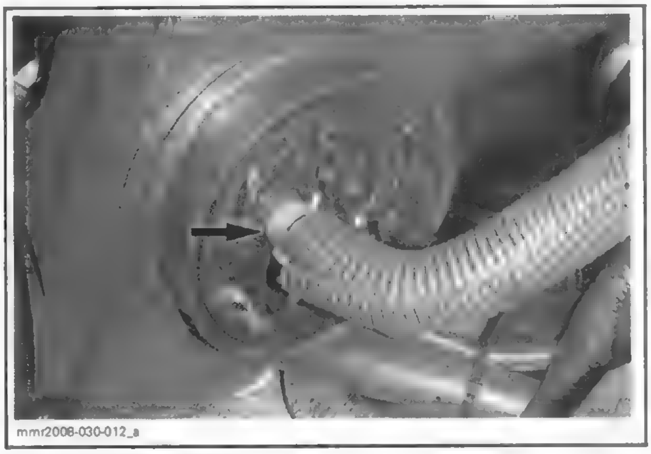
Disconnect fuel pressure line at the fuel rail, place a rag over the quick disconnect as you remove it.

Remove hose assembly from vehicle.

Fuel Pressure Regulator Installation

Reverse the removal procedures for installation.

Install a new Oetiker clamp on the regulator hose.



NEW OETIKER CLAMP

When installation is complete, carry out a high pressure leak test, refer to *HIGH PRESSURE LEAK TEST (ELECTRIC FUEL PUMP CIRCUIT)* in this section.

CAUTION: Ensure hose clamps are tight and that hoses cannot turn on their fittings.

IN-TANK FUEL STRAINER

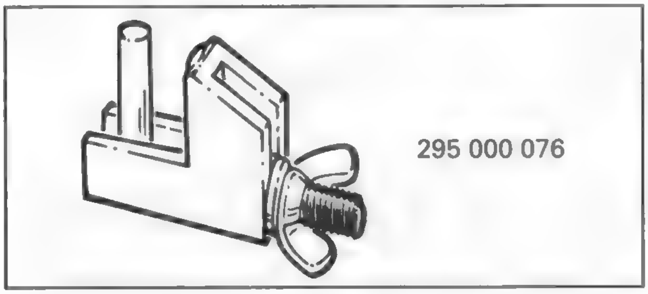
500SS/800R

Strainer Removal

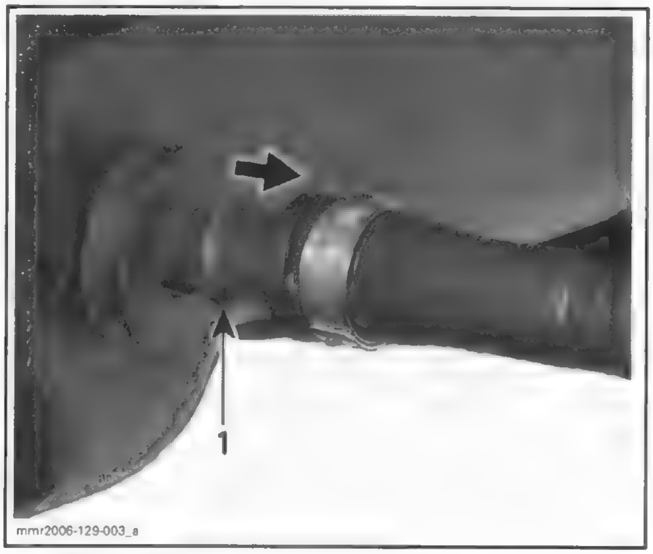
Drain fuel tank.

Move fuel tank back for access to fuel tank outlet hose, refer to *FUEL TANK REMOVAL* in this section.

Install a hose pincher on the outlet line.



Pull out fuel tank outlet hose fitting from grommet to small part of fitting so that it is loose in the grommet.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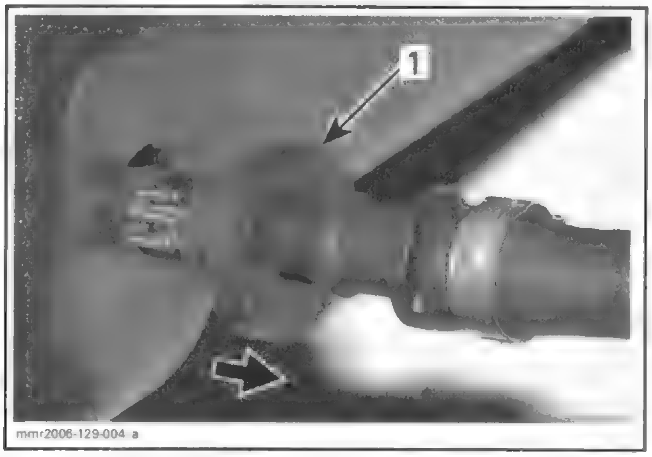
1. *Fuel tank fitting*

Pull out grommet from fuel tank.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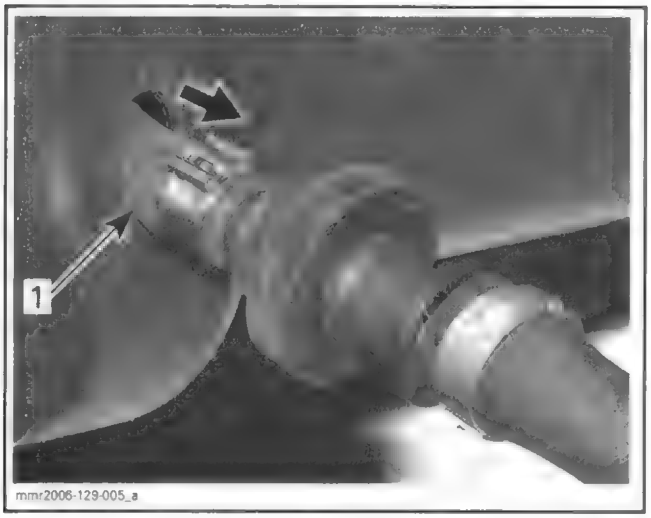
1. *Grommet*

500SS/800R except Summit

Pull out pick-up hose with strainer.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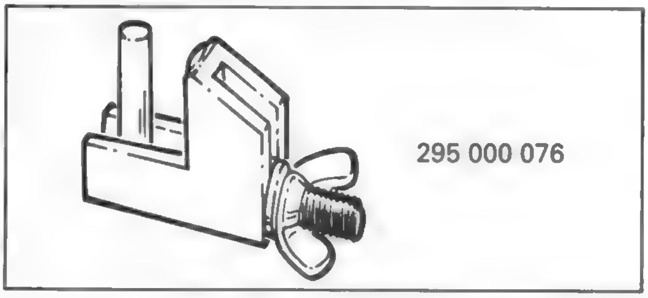
1. *Pick-up hose*

Summit 800R (Dual Pick-ups)

Drain fuel tank.

Move fuel tank back for access to fuel tank outlet hose, refer to *FUEL TANK REMOVAL* in this section.

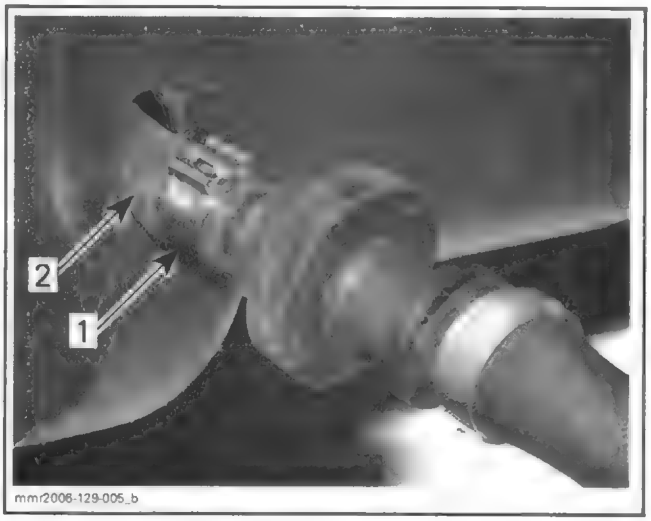
Install a hose pincher on the outlet line.



Pull out fuel tank outlet fitting from grommet to small part of fitting so that it is loose in grommet.

Pull grommet out of fuel tank.

Open Norma spring clamp using Oetiker pliers and separate hose from fuel tank fitting.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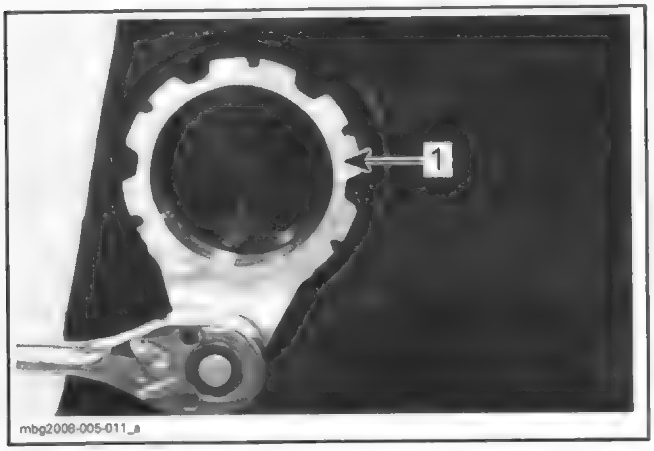
1. *Open Norma spring clamp*
2. *Separate hose from fuel tank fitting*

Discard Norma clamp.

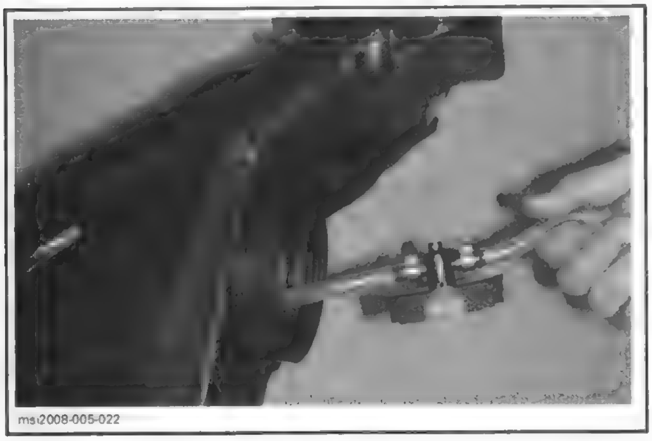
Using the fuel pump nut tool (P/N 529 036 118), remove the fuel pickup cover.



1. *Fuel pump nut tool*

Push back hose inside fuel tank.

Pull out fuel pickups from fuel tank opening.



Replace strainer or pick-up if clogged.

Strainer Installation

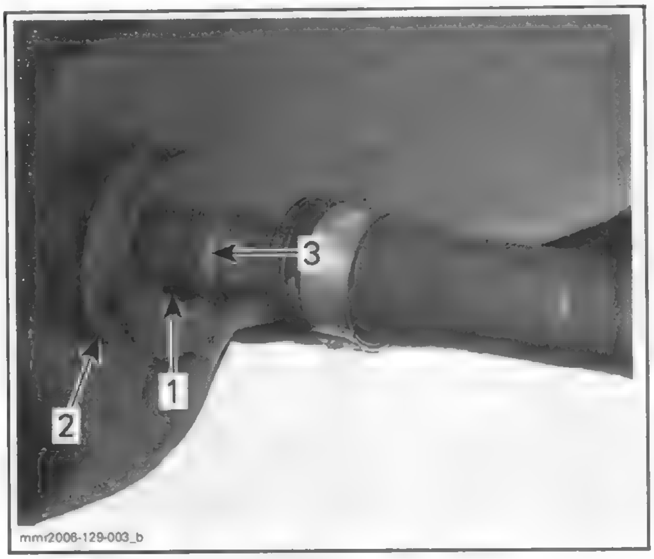
Installation is the reverse of the removal procedure. Pay attention to the following details.

500SS/800R except Summit

Reverse the removal procedure.

Install grommet on fuel tank then push fuel tank fitting through grommet.

NOTE: To facilitate installation of the grommet in the fuel tank, it should be on the smaller portion of the fuel tank fitting.

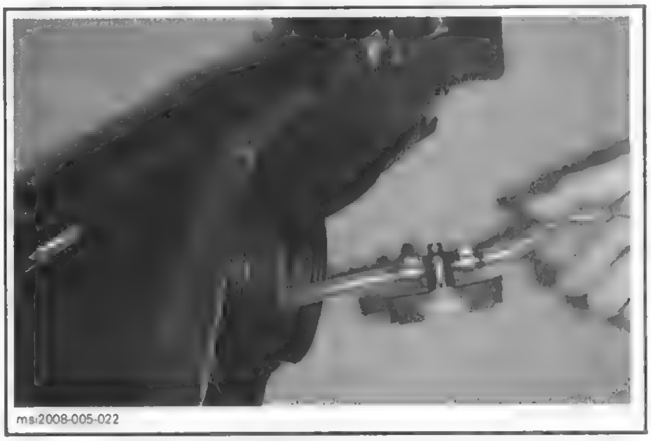


1. *Small portion of fuel tank fitting*
2. *Grommet inserted in fuel tank*
3. *Push fitting in grommet*

Carry out a fuel system leak test, refer to *FUEL SYSTEM PRESSURIZATION* in this section.

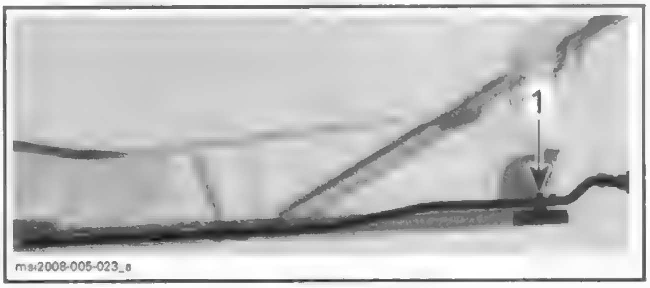
Summit 800R (Dual Pick-ups)

Insert the new fuel pick-up assembly through fuel tank opening.



Install hose and multi-point (MP) pick-up.

CAUTION: Position the MP pick-up as illustrated. Pay particular attention to the MP pick-up position (facing down in fuel tank).

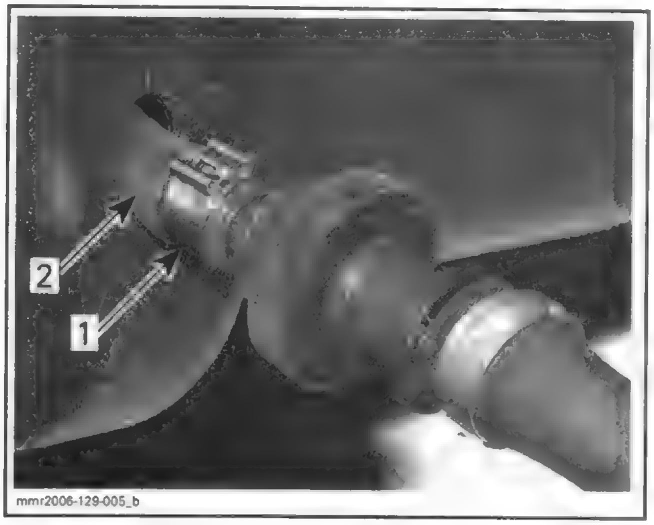


1. *MP pick-up location*

Run fuel pickup assembly hose through fuel tank access hole.

Install fuel pickup assembly hose on tank outlet fitting.

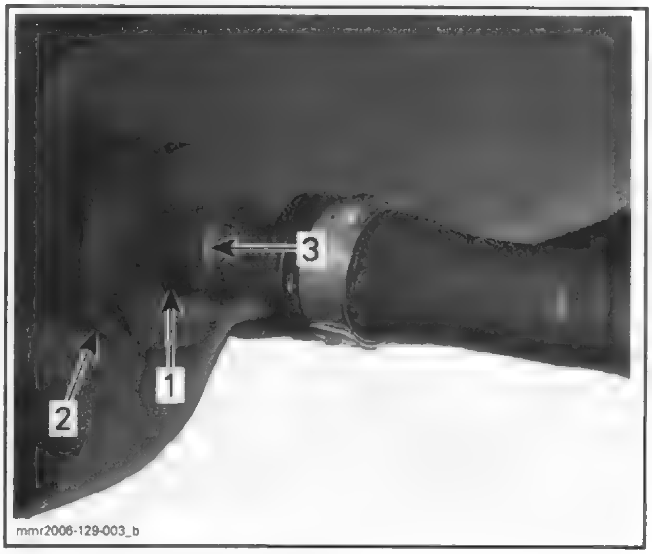
Secure with a new Norma spring clamp.



1. *New Norma spring clamp*
2. *Pick-up hose installed on fitting*

Install grommet in fuel tank.

NOTE: To facilitate installation of the grommet in the fuel tank, it should be on the smaller portion of the fuel tank fitting.



1. *Small portion of fuel tank fitting*
2. *Grommet inserted in fuel tank*
3. *Push fitting in grommet*

Push fitting in grommet.

Carry out a fuel system leak test, refer to *FUEL SYSTEM PRESSURIZATION* in this section.

IN-LINE FUEL FILTER

600 HO SDI

Filter Replacement

The fuel filter, fuel pressure regulator, inlet and outlet hoses come as an assembly.

Follow the same procedures for removing and installing the fuel pressure regulator.

Pay particular attention to the following.

When installation is complete, carry out a high pressure leak test, refer to *HIGH PRESSURE LEAK TEST (ELECTRIC FUEL PUMP CIRCUIT)* in this section.

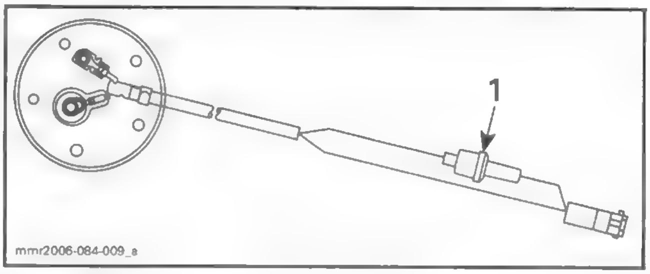
CAUTION: Ensure hose clamps are tight and that hoses cannot turn on their fittings. Also ensure fuel pump pressure hose quick-disconnects are firmly pushed in and locked to prevent leakage.

ELECTRIC FUEL LEVEL SENSOR

Sensor Fuse Inspection

A 0.25 A in line fuse located near the sensor protects the fuel level sensor circuit. Check fuse to see if it is blown.

If fuse is blown, test circuit for a short to ground. Also carry out a resistance test of the sensor.



TYPICAL
1. *In-line fuse*

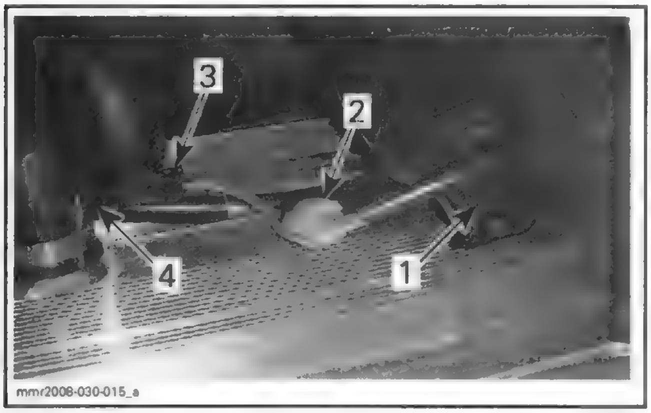
Fuel Level Sensor Removal

Drain fuel tank.

Move fuel tank back enough to access fuel sensor and connector. Refer to *FUEL TANK REMOVAL* in this section.

NOTE: It is not necessary to disconnect fuel pump.

Disconnect fuel sensor connector.



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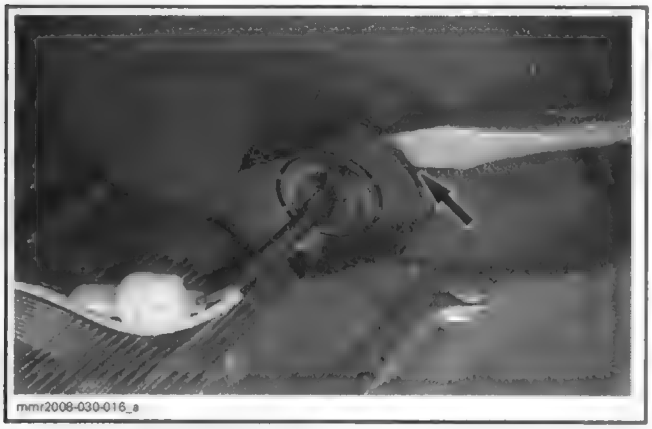
1. *Fuel sensor*
2. *In-line fuse*
3. *Connector*
4. *Connector routing*

NOTE: Take note of connector and wiring harness routing between the two coolant hoses. They must be rerouted this way on installation.

Insert a screwdriver between grommet and sensor face plate. Gently pry sensor loose in grommet.

NOTE: Do not try to remove sensor from grommet at this time.



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Remove grommet from fuel tank.

Carefully rotate sensor as you pull it out of fuel tank.

CAUTION: Float arm is precisely bent and must not be altered on removal or installation.

Fuel Level Sensor Installation

Fuel level sensor installation is the reverse of removal procedure. Pay attention to the following.

500SS/800R

Carry out a resistance test of sensor before installation, refer to *FUEL LEVEL SENSOR RESISTANCE TEST* in this section.

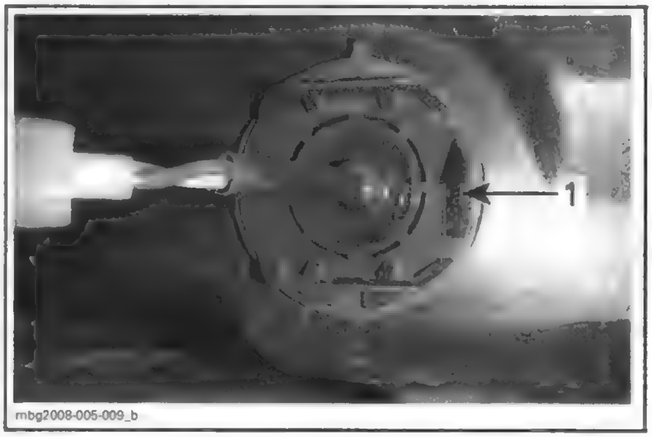
600 HO SDI

On these models, it is possible to connect sensor to harness, set cut-out switch to OFF, press start button and check fuel gauge indication before sensor is installed in fuel tank.

All Models

Carefully insert float sensor through hole in tank gently rotating it in position.

NOTE: Ensure the arrow on face of sensor is pointing upwards.



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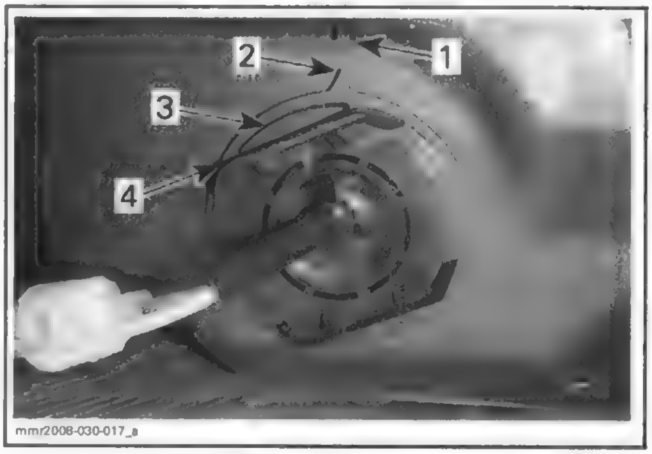
1. *Arrow facing up*

Push grommet flush in tank with grommet alignment indicator in line with the two notches on the fuel tank.

Align top flat portion of sensor with alignment boss on grommet and push it in until it bottoms out.



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1. *Alignment notches in tank*
2. *Grommet alignment indicator*
3. *Alignment boss*
4. *Sensor aligned to grommet boss*

NOTE: Note the angle at which the fuel level sensor is positioned. This is critical for proper operation.

Use dielectric grease (P/N 293 550 004) in connector to prevent corrosion.

Carry out a fuel system leak test, refer to *FUEL SYSTEM PRESSURIZATION* in this section.

Test fuel level indication as you fill fuel tank before you complete reassembly of vehicle.

Fuel Level Sensor Resistance Test

Obtain access to fuel level sensor connector, refer to *FUEL TANK REMOVAL* in this section.

Disconnect fuel level sensor.

Connect a multimeter set to Ω between the two pins in the sensor connector.

Test resistance of sensor as follows.

FUEL LEVEL SENSOR RESISTANCE TEST	
Full level resistance value	10 Ω +0 / – 6
Empty level resistance value	90 Ω +10 / – 0

Replace sensor if not as specified in table.

FUEL TANK

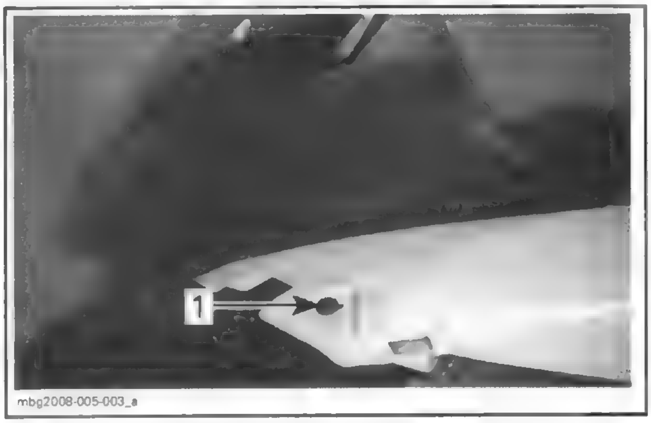
Fuel Tank Removal

500SS/800R

Remove the following, refer to *BODY*:

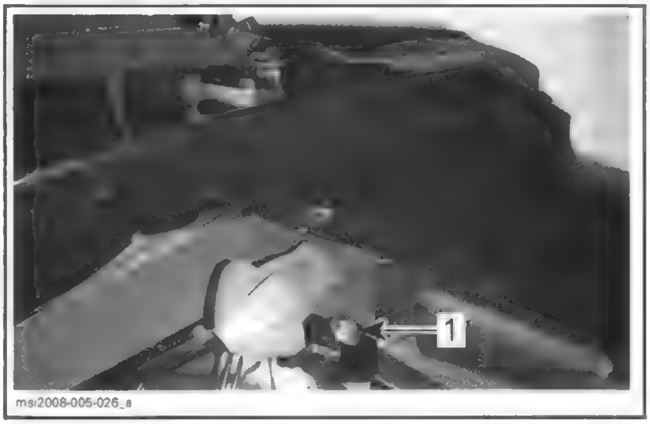
- Seat
- Both side panels
- Hood.

Remove Torx screws securing front section of console (one each side).



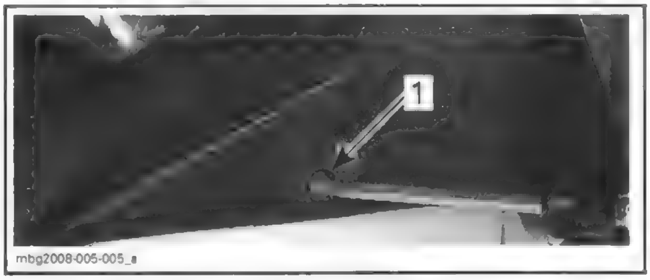
1. Front console retaining screw (one each side)

Remove Torx screws securing rear section of console (one each side).



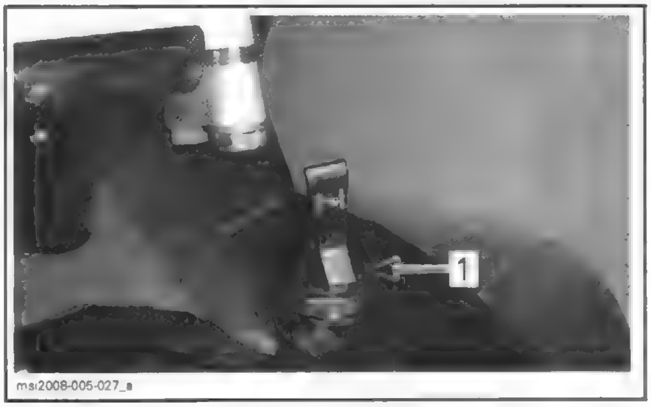
1. Rear Torx screws on console (one each side)

Remove the Torx screws securing gauge support (one each side).



1. Gauge support Torx screws (one each side)

Remove choke lever nut.

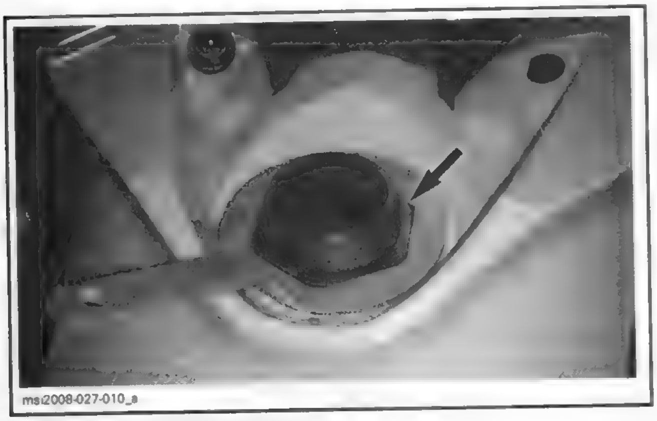


1. Choke lever nut

Push back the choke lever inside its hole.

Remove fuel tank cap and syphon fuel tank.

Remove filler neck retaining nut using the fuel tank nut wrench (P/N 529 035 891).

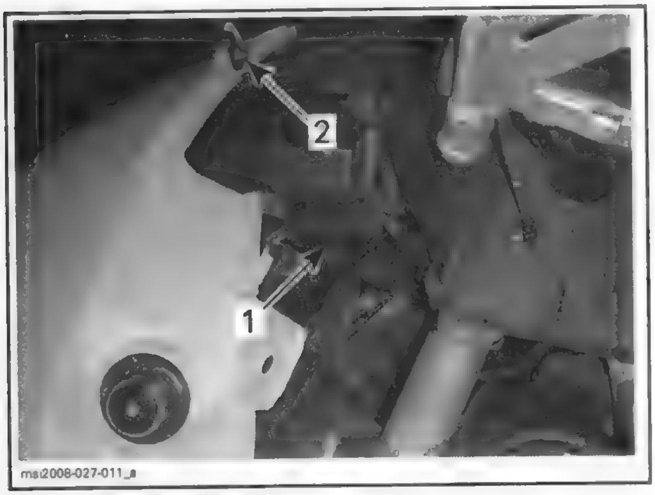


FILLER NECK RETAINING NUT

Install fuel tank cap as a precaution.

Pull up on aft section of console to release aft mounting tabs from under side frame members, and to clear fuel tank filler neck. Carefully and slowly pull back on console until you can see the DESS post connector.

NOTE: Pay particular attention to the console front mounting tabs. The metal retainers (nuts) on these tabs could easily scratch the console or other trim panels.

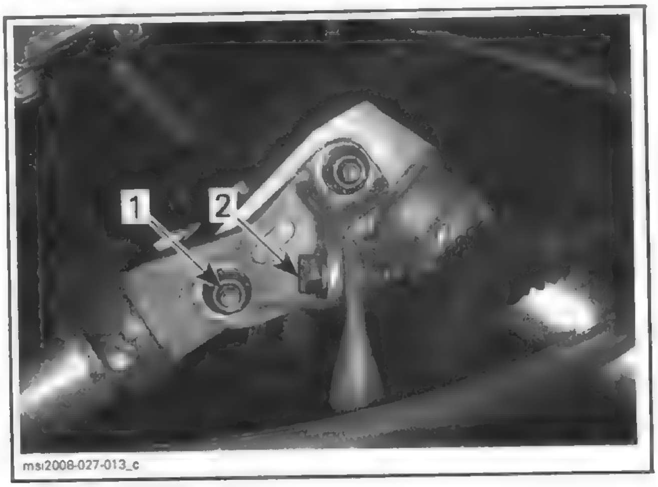


1. *DESS post connector*
2. *Metal retainers (nuts)*

Disconnect the DESS post connector, then carefully pull back on the console to remove it from vehicle.

Gently lift up on the rear section of the gauge support to gain access to the front mounting bolts of the rear frame members.

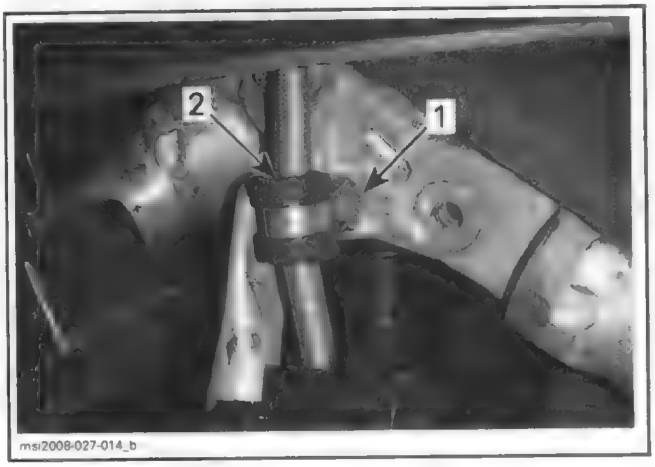
Remove the forward mounting bolt on the rear frame member, and the upper column support mounting bolts as indicated on the illustration. Discard the elastic nuts.



RIGHT SIDE SHOWN

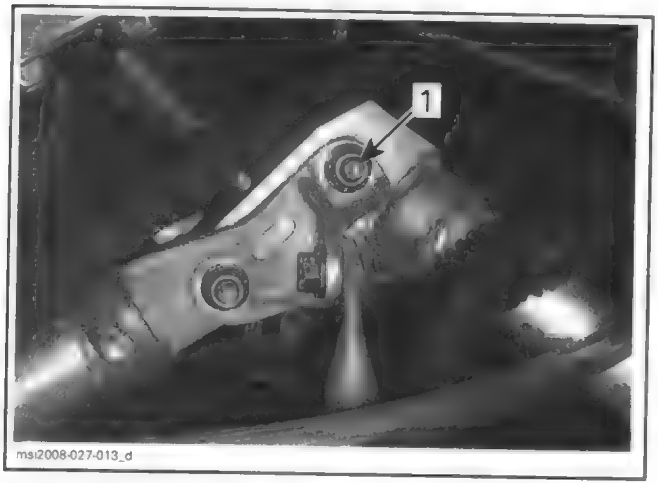
1. *Forward mounting bolt, rear frame member*
2. *Mounting bolts (one each side), upper column support*

NOTE: Note position of brake hose retaining clamp on LH side mounting bolt of the upper column support as indicated in the following illustration.



1. *LH mounting bolt, upper column support*
2. *Brake hose retaining clamp*

Release the torque applied to the mounting bolt of the front frame member, but do not remove bolt and elastic nut.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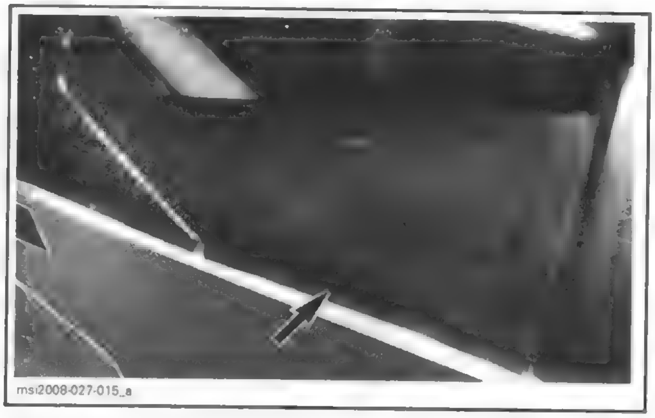
1. Mounting bolt, front frame member

Remove trim panels covering the aft end of the side frame members by pulling upward then pulling out (one each side).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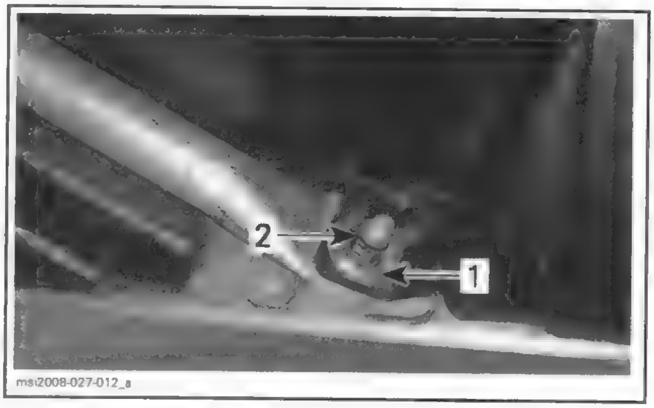
Remove elastic nut and shoulder bushing retaining the rear frame members (one each side) to the tunnel (discard nuts, keep shoulder bushings).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1. Shoulder bushing
2. Elastic nut

Disconnect fuel tank vent line at check valve.

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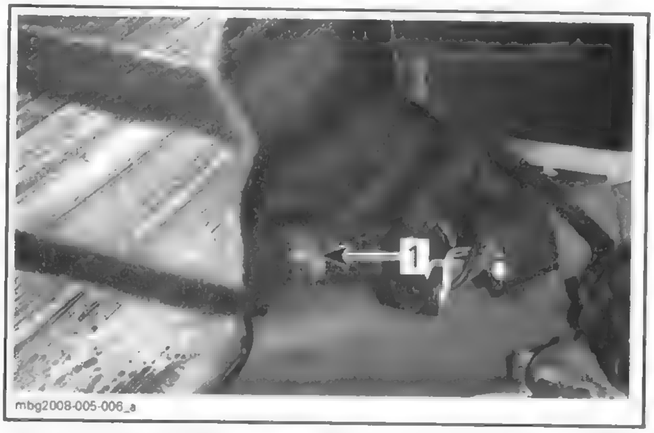
DISCONNECT FUEL VENT LINE

Install a small hose pincher (P/N 295 000 076) on the fuel tank outlet hose.

Disconnect the fuel line by cutting the Oetiker clamp and pulling the hose off the fitting.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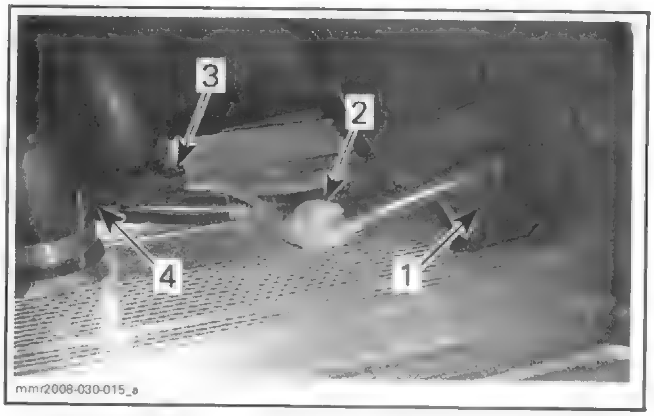
1. Oetiker clamp, fuel tank outlet hose

Unplug the fuel level sensor connector.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1. Fuel level sensor
2. In-line fuse
3. Connector
4. Connector routing

Carefully and slowly lift the end of the fuel tank and remove it from vehicle.

600 HO SDI

Fuel tank removal procedure is the same as for the **500SS** and **800R** models except for the following:

- No choke lever to remove.
- Release fuel pressure in the system, refer to the *COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE* section.
- Disconnect electric fuel pump as per the *FUEL PUMP REMOVAL* procedure in this section.

Fuel Tank Installation

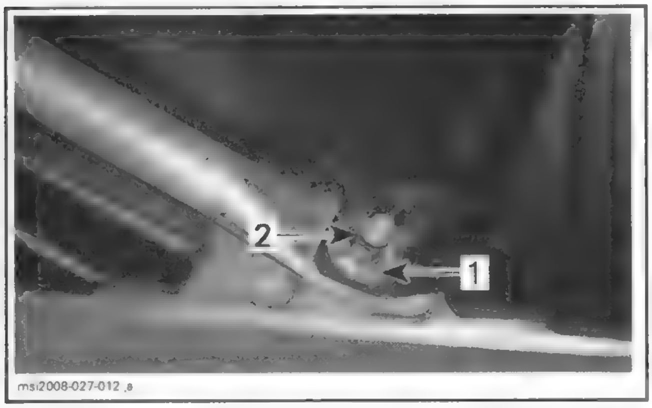
Installation procedures are the reverse of removal procedures. However, pay attention to the following.

⚠ WARNING

Make sure vent tube is not kinked or pinched.

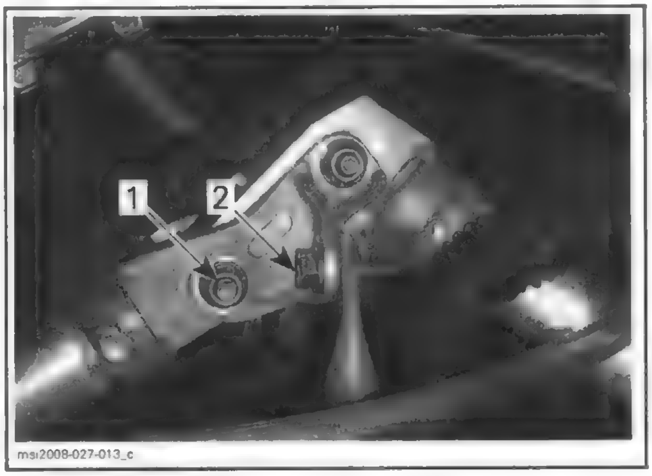
Install shoulder bushings and NEW M8 elastic nuts on the rear frame members (one each side).

Torque to 33 N•m (24 lbf•ft).



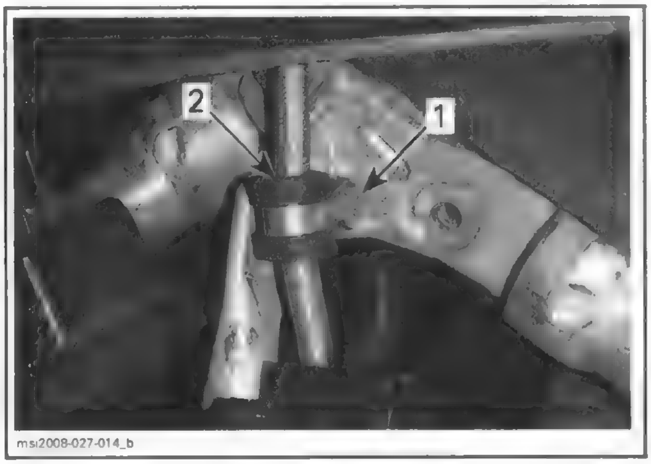
1. Shoulder bushing
2. Elastic nut

Insert the forward mounting bolt on the rear frame member, and the two bolts on the upper column support. Secure with new elastic nuts.



RIGHT SIDE SHOWN
1. Forward mounting bolt, rear frame member
2. Mounting bolts (one each side), upper column support

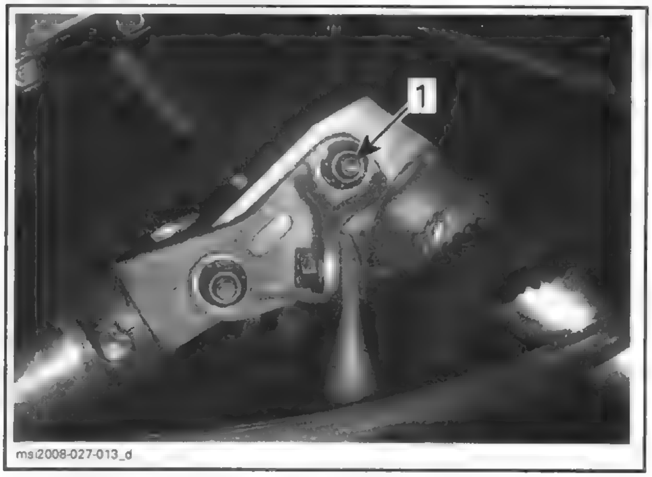
NOTE: Note position of brake hose retaining clamp on LH side mounting bolt of the upper column support as indicated in the following illustration.



1. LH mounting bolt, upper column support
2. Brake hose retaining clamp

Torque forward nut on rear frame members and nuts on upper column supports to 18 N•m (159 lbf•**in**).

Torque elastic nut on the front frame member mounting bolt to 18 N•m (159 lbf•**in**).



1. Mounting bolt, front frame member

Torque the fuel tank filler neck nut to 11 N•m (97 lbf•**in**).

Carry out a fuel system leak test, refer to *FUEL SYSTEM PRESSURIZATION* in this section.

600 HO SDI

The installation procedure is the same as **500SS** and **800R** models except for the following:

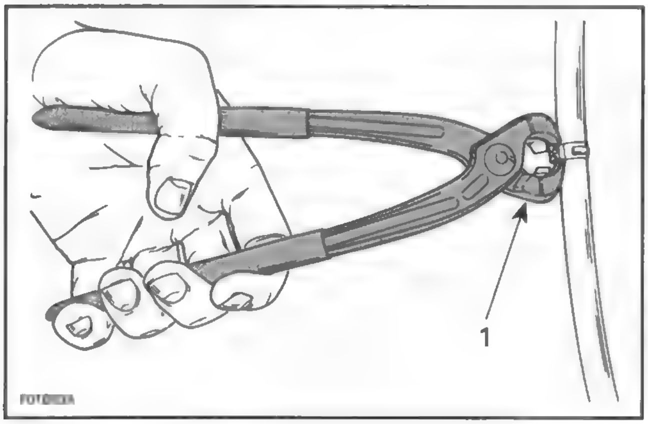
- No choke lever to install.
- Electric fuel pump connection.

Refer to the *FUEL PUMP INSTALLATION* procedure in this section.

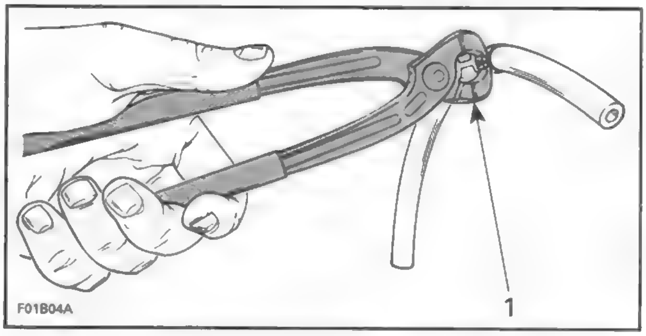
Carry out a fuel system leak test and a high pressure leak test, refer to *FUEL SYSTEM PRESSURIZATION* and *HIGH PRESSURE LEAK TEST (ELECTRIC FUEL PUMP CIRCUIT)* in this section.

OETIKER CLAMPS

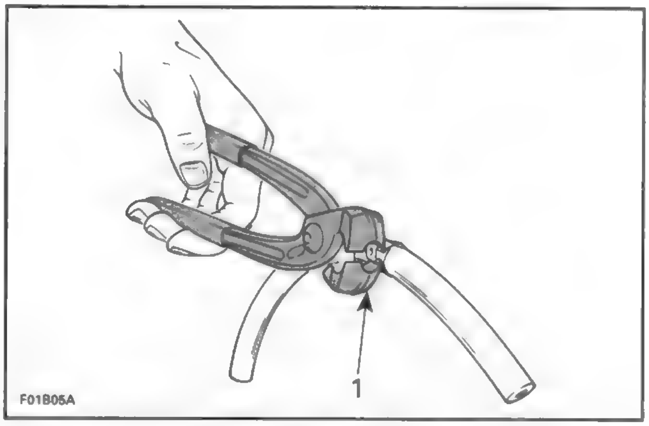
To secure or cut Oetiker clamps on fuel lines, use pliers Oetiker 1099 (P/N 295 000 070).



1. Cutting clamp



1. Securing clamp



1. Securing clamp in limited access

⚠ WARNING

Use of improper fuel lines could compromise fuel system integrity.

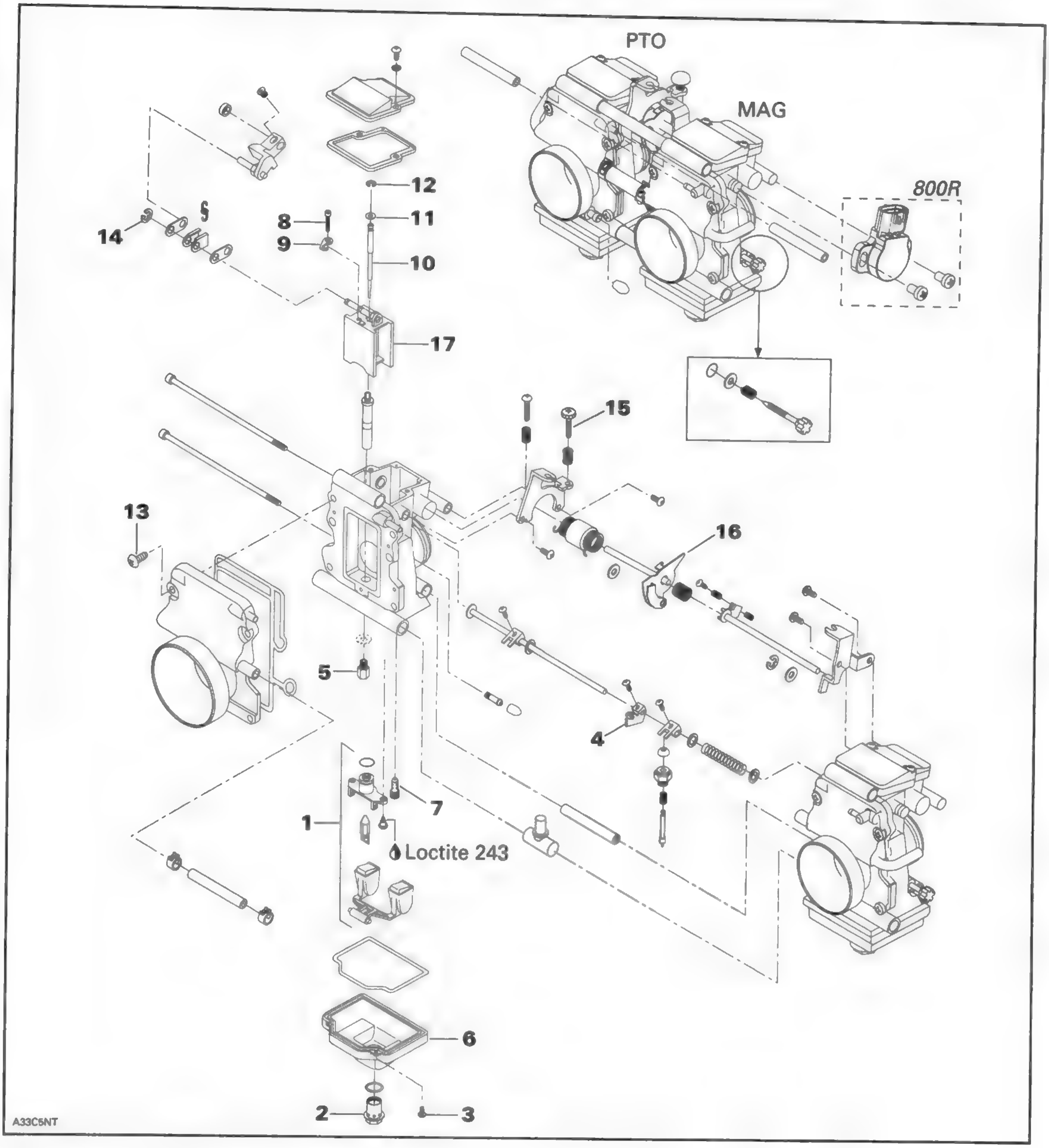
TM CARBURETORS

SERVICE TOOLS

Description	Part Number	Page
small hose pinchers	295 000 076	230
carburetor tool kit	404 112 000	223
digital inductive type tachometer	529 014 500	227
supply harness	529 035 869	230
supply cable	529 035 997	230

SERVICE PRODUCTS

Description	Part Number	Page
dielectric grease	293 550 004	232
Loctite 243 (blue)	293 800 060	225


PTO
MAG
800R
Loctite 243
A33C5NT

PROCEDURES

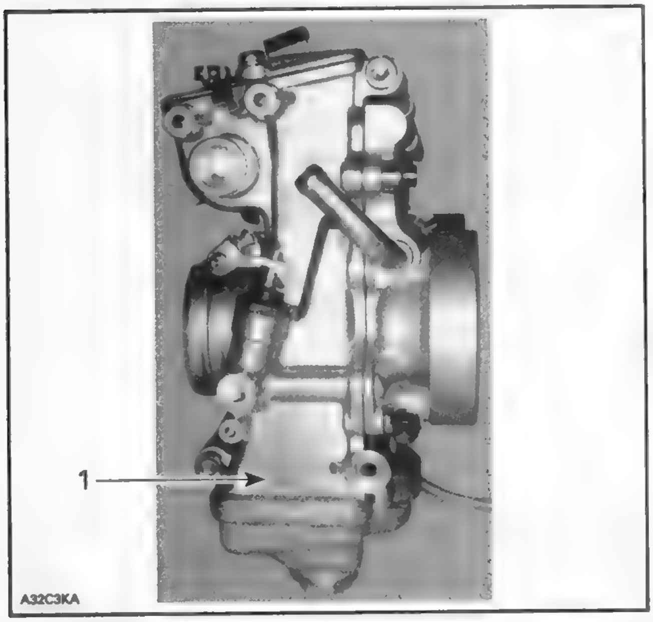
CARBURETOR

General

NOTE: On **800R** models, it is a good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to *MONITORING SYSTEM/FAULT CODES*.

Carburetor Identification

TM type dual carburetor assembly is identified on PTO side carburetor body.



TYPICAL
1. Identification: TM 40-B322

Carburetor Removal

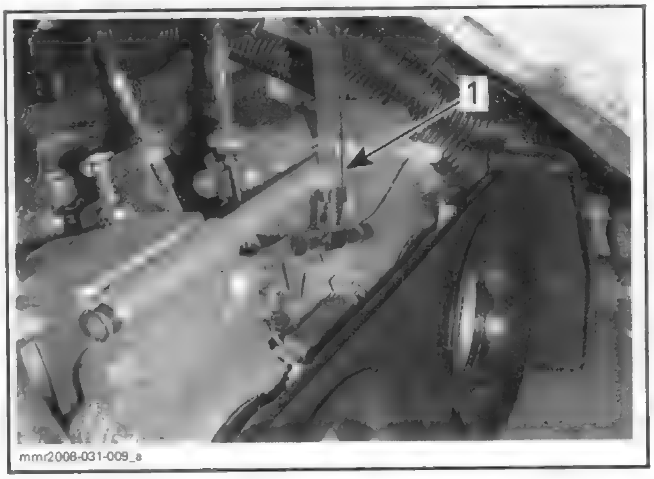
Remove LH side panel.

Remove belt guard. Refer to *DRIVE SYSTEM/BRAKE* section.

Remove primary air intake silencer. Refer to *ENGINE* section.

500SS

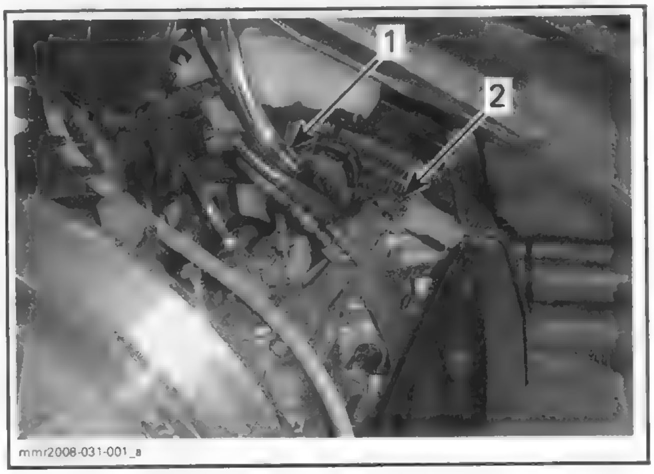
Disconnect vent hose.



1. Hose

800R

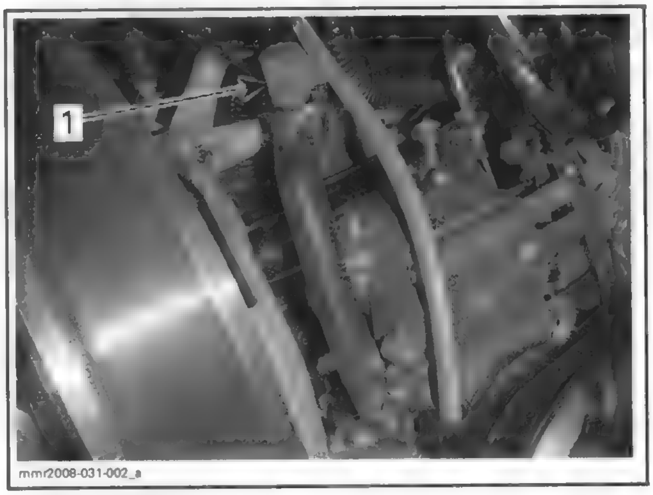
Disconnect DPM manifold top hose and connector.



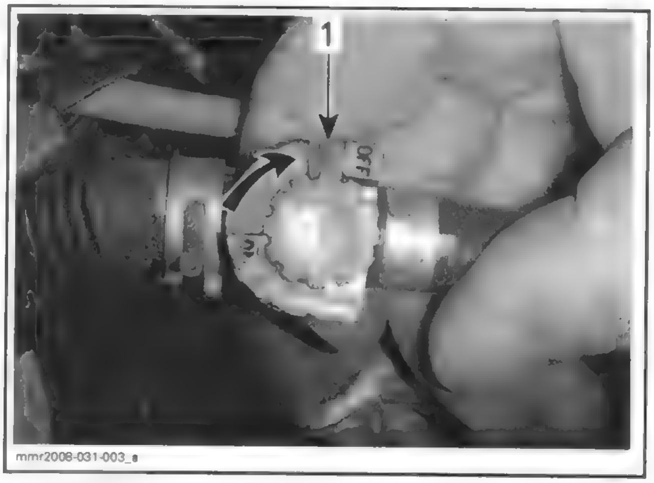
1. Hose
2. Connector

500SS/800R

Turn heated carburetor coolant inlet line valve to OFF position.

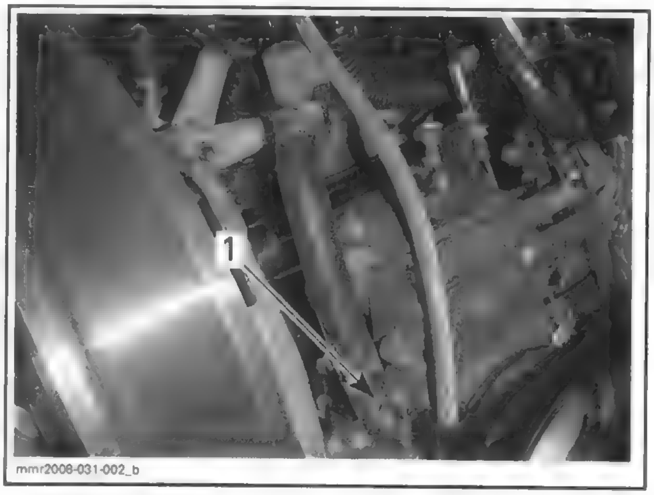


1. Inlet line valve


1
OFF
mmr2008-031-003_a

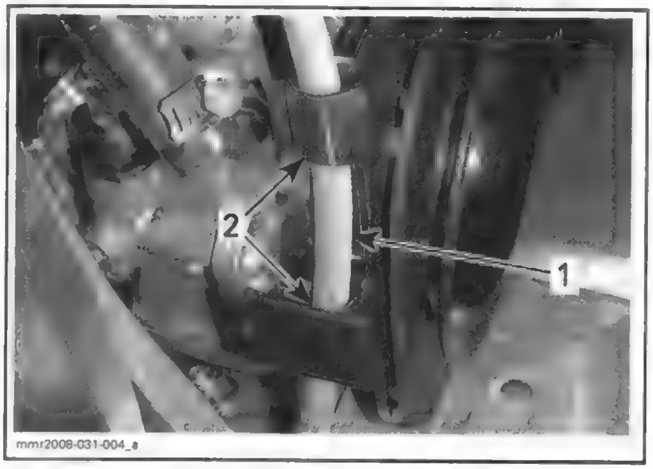
1. OFF position

Disconnect **inlet** line from carburetor taking care to recuperate coolant.


1
mmr2008-031-002_b

1. Disconnect here

Detach brake hose from adapter plate.


2
1
mmr2008-031-004_a

TYPICAL
1. Hose
2. Release from adapter plate

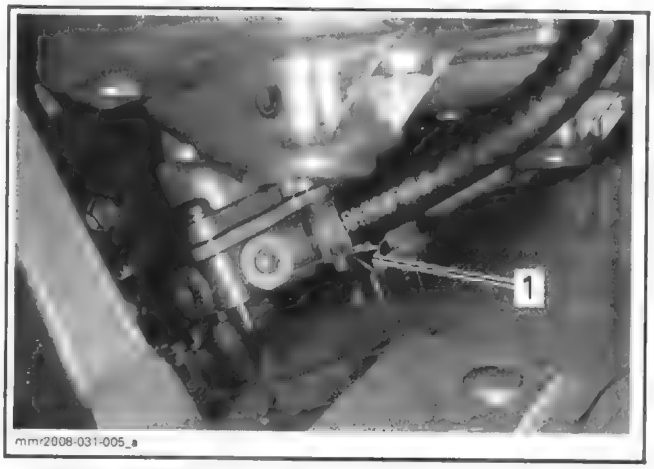
Loosen clamps retaining carburetors to intake adapters.

Detach carburetors from intake adapters.

Lift carburetors then disconnect fuel line from fuel pump. Take care to recuperate fuel.

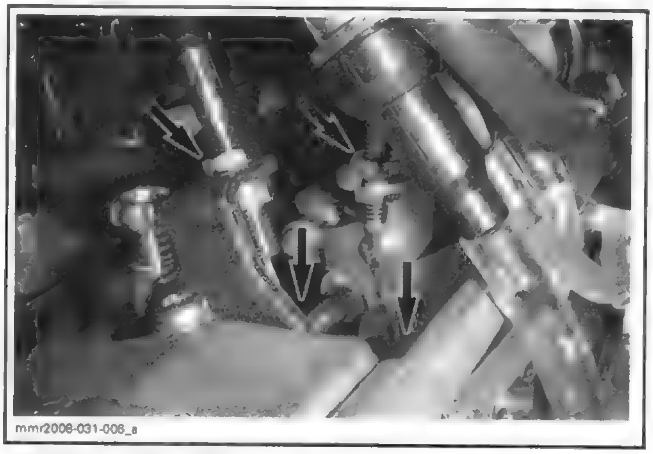
⚠ WARNING

Fuel is flammable and explosive under certain conditions. Always wipe off any fuel or oil spillage from the vehicle. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.


1
mmr2008-031-005_a

1. Disconnect here

Detach and disconnect throttle and choke cables.


mmr2008-031-006_a

THROTTLE AND CHOKE CABLES

800R

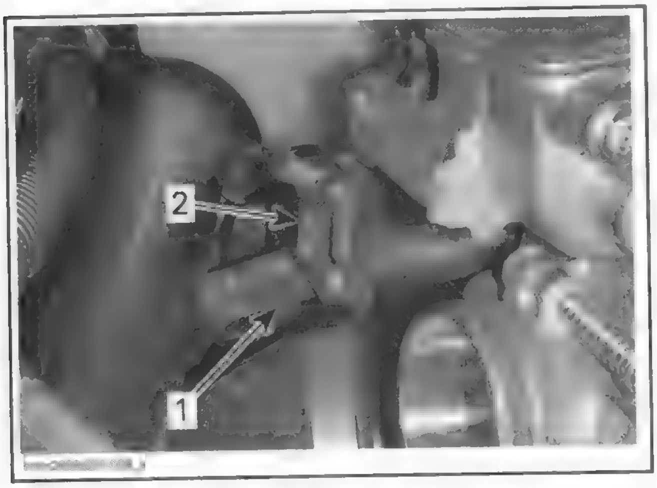
Disconnect TPS connector.

1
mmr2008-031-007_a

1. Connector

500SS/800R

Pinch and disconnect heated carburetor **outlet** line taking care to recuperate coolant.

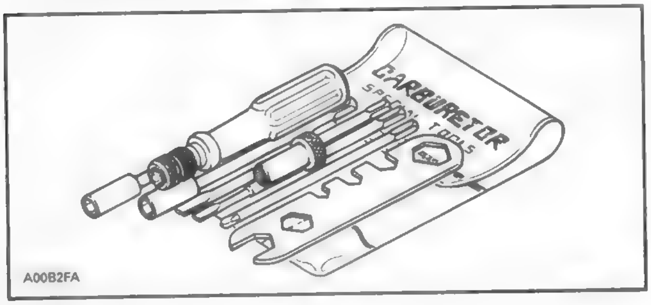


1. Outlet line
2. Hose pincher

Remove carburetors.

Carburetor Disassembly

NOTE: To ease the carburetor disassembly and assembly procedures, it is recommended to use carburetor tool kit (P/N 404 112 000).



Float Bowl

Unscrew drain plug **no. 2** and screws **no. 3**. Remove float bowl **no. 6**.

Float and Needle Valve Assembly

Unfasten both screws then, pull out float and needle valve assembly **no. 1**.

Main Jet

The main jet **no. 5** installed in the carburetor has been selected for a temperature of - 20°C (0°F) at sea level. Different jetting can be installed to suit temperature and/or altitude changes. A Service Bulletin gives information about calibration according to altitude and temperature.

Main jet **no. 5** may be removed without removing float bowl **no. 6** by first removing drain plug **no. 2**.

Pilot Jet

Use narrow screwdriver from carburetor tool kit (P/N 404 112 000) to unscrew pilot jet **no. 7**.

Throttle Slide

⚠ WARNING

It is critical to the free operation of the throttle slide that the 2 connecting plates as assembled in one carburetor be of the exact same length. Always replace the connecting plates by a pair of new ones that were matched at the factory for length and discard the old ones. Simultaneously replace all the plates of the carburetors of a same rack.

Do not disassemble throttle slide **no. 17** needlessly.

CAUTION: After throttle slide reassembly, proceed with a leak test. See below for procedure.

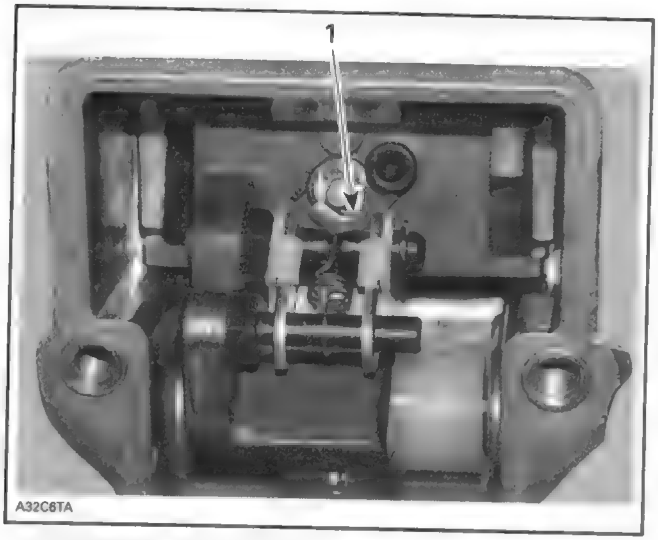
Disassemble both carburetors at the same time. Coolant hose between carburetor throttle slide covers must remain in place during the complete disassembly and assembly.

Remove carburetor cover.

Loosen needle retainer screw **no. 8**.

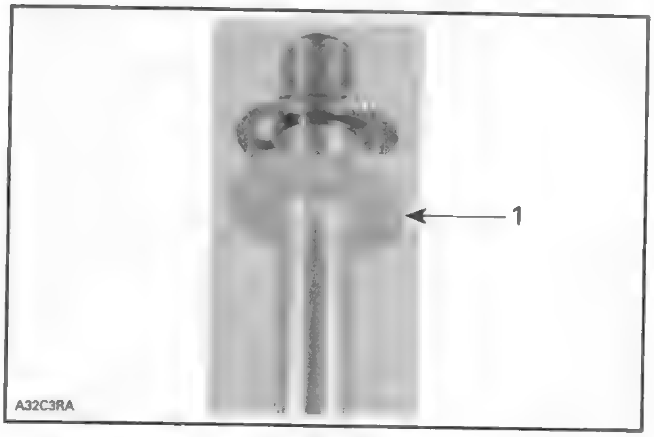
Fully open throttle and hold in this position for the following step.

Move aside needle retainer **no. 9**.



1. Needle retainer moved aside

Turn dual carburetor assembly upside down to free needle **no. 10**. Take care not to loose plastic washer **no. 11** under needle circlip **no. 12**.

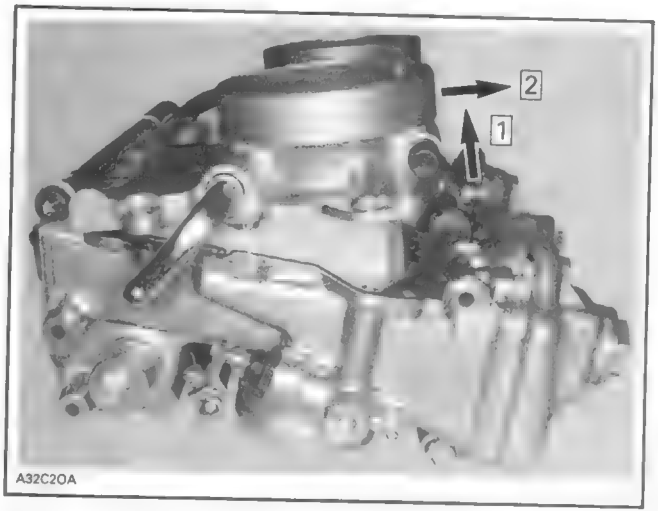


1. Plastic washer

Unscrew throttle slide cover screws **no. 13**.

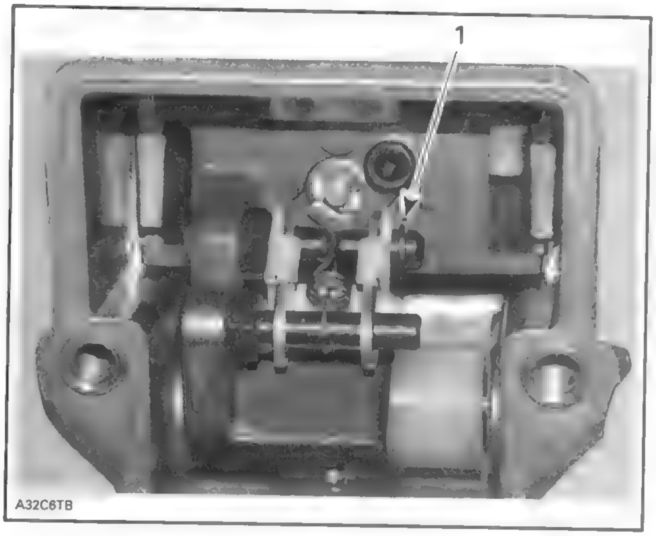
Open throttle 3/4 wide and keep that opening.

Lift throttle slide covers bottom first until they are free from carburetor bodies. Then, slide them out.



Step 1: Lift bottom first
Step 2: Slide out

Remove circlip **no. 14** retaining throttle slide.



1. Circlip

Carburetor Cleaning

The entire carburetor should be cleaned with a general solvent and dried with compressed air.

CAUTION: Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O-rings, etc. Therefore, it is recommended to remove those parts prior to cleaning.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions. When jets are very dirty or coated with varnish and gum, replace them.

⚠ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

Carburetor Inspection

Check throttle slide for wear. Replace as necessary.

Check for fuel soaked into float **no. 1**; replace as necessary.

Check float for cracks or other damages affecting free movement; replace as necessary.

Carburetor Assembly

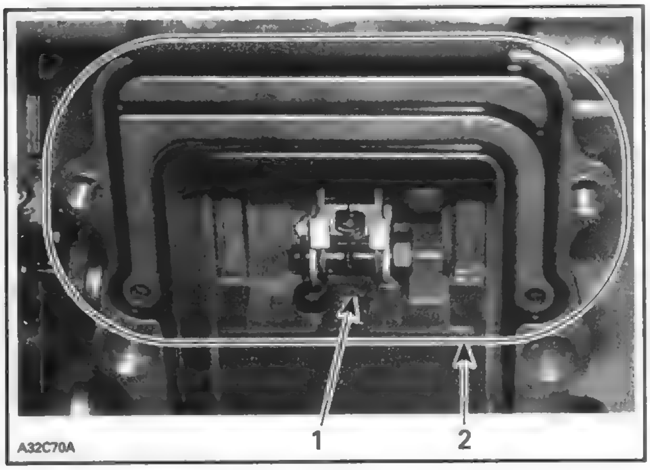
The assembly is the reverse of the disassembly procedure. Pay attention to the following.

Float and Needle Valve Assembly

Apply Loctite 243 (blue) (P/N 293 800 060) on screw threads.

Throttle Slide

At throttle slide assembly, needle retainer must face carburetor body.



1. *Needle retainer*
2. *Ensure O-ring gasket is properly seated in nipple area*

After inserting throttle slide cover in place and before installing screws, ensure O-ring gasket is properly seated in its groove especially in the area around vent nipple. See illustration above.

Carburetor Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

If carburetors were disassembled, adjustments should be performed following this sequence:

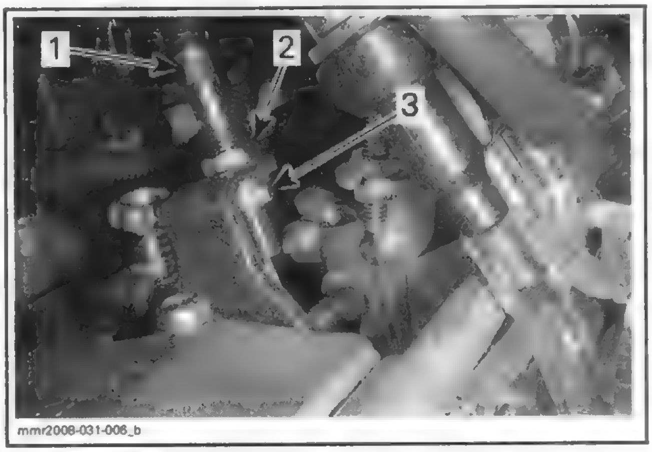
1. Carburetor synchronization
2. Pilot screw adjustment
3. Closed throttle reset (TPS) (800R)
4. Throttle cable adjustment
5. Idle speed adjustment
6. Choke cable adjustment.

Refer to procedures in this section in regards with these adjustments.

Carburetor Synchronization

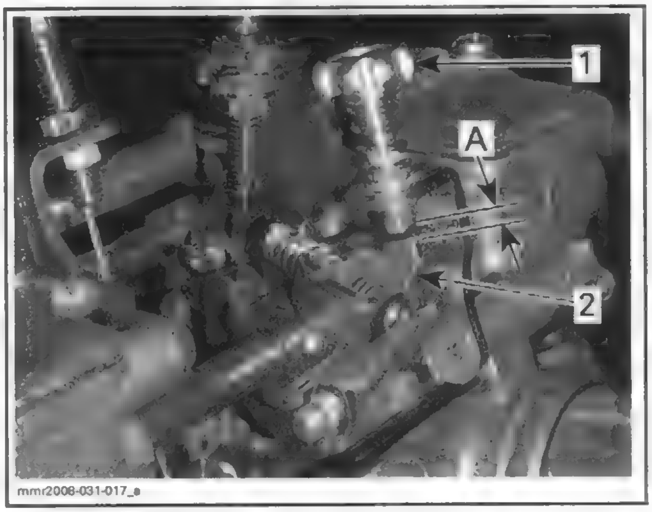
To ensure throttle cable does not pull on throttle slide, do the following:

- Loosen throttle cable housing adjusting and locking nuts.



1. *Throttle cable*
2. *Adjusting nut*
3. *Locking nut*

- Unscrew idle speed screw until there is a gap between tip of screw and throttle lever stopper.



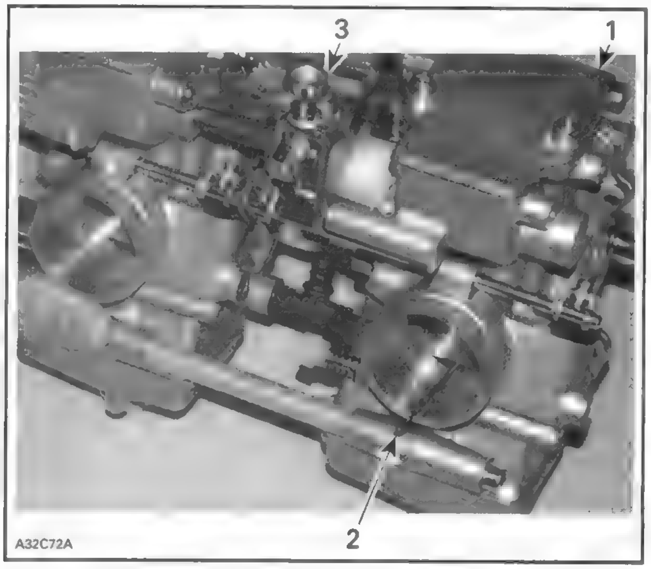
1. *Idle screw*
2. *Throttle lever stopper*

A. *Gap required here*

To perform carburetor synchronization, first proceed on PTO carburetor.

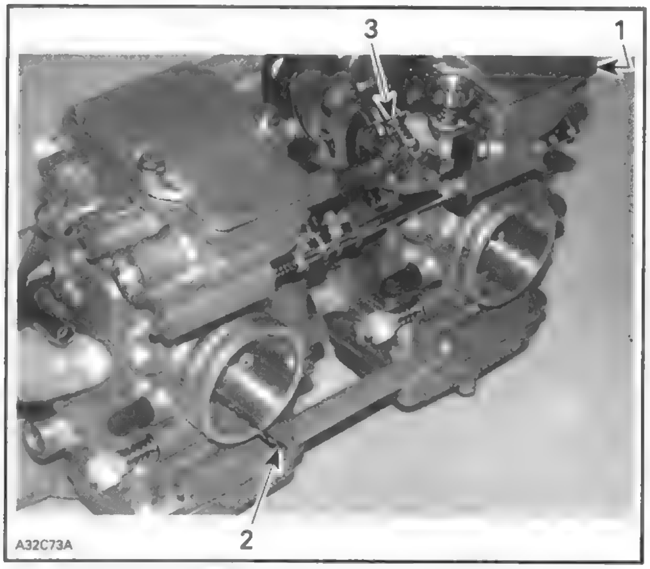
Use a drill bit to measure flat slide height (see following table) on **outlet** side of carburetor (engine side).

Adjust by turning idle speed screw **no. 15**.



1. Adjust PTO carburetor first
2. Drill bit used as a gauge to measure flat slide height
3. Idle speed screw

For MAG carburetor use synchronization screw. Use same drill bit as for PTO carburetor to measure flat slide height. Turn synchronization screw to adjust.

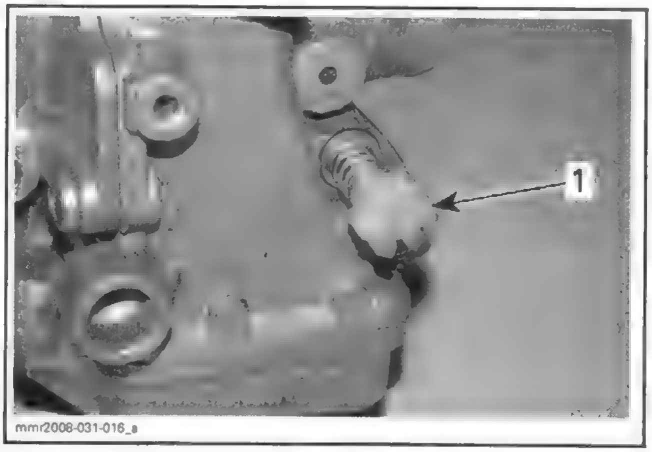


1. PTO carburetor adjusted first
2. Drill bit used as a gauge to measure flat slide height
3. Synchronization screw

MODEL	FLAT SLIDE HEIGHT (DRILL BIT SIZE) ± 0.1 MM (± .004 IN)
500SS	1.5 (.059)
800R	SUMMIT: 2.0 (.079) Others: 1.6 (0.063)

Pilot Screw Adjustment

Completely close the pilot screw (until a slight seating resistance is felt) then back off as specified.



1. Pilot screw (one on each carburetor)

Turning screw in clockwise leans mixture and conversely, turning it out counterclockwise enriches mixture.

ENGINE	TURNS
500SS/800R	1.5

Closed Throttle Reset (TPS)

800R

This reset is very important. The setting of the TPS will determine the basic parameters for all fuel and ignition mappings. An improperly set TPS may lead to poor engine performance.

Reset must be done each time one of the following conditions is met:

- Throttle position sensor (TPS) is loosened or removed.
- Carburetor is replaced.
- ECM is replaced.

Refer to *THROTTLE POSITION SENSOR (TPS)* in this section.

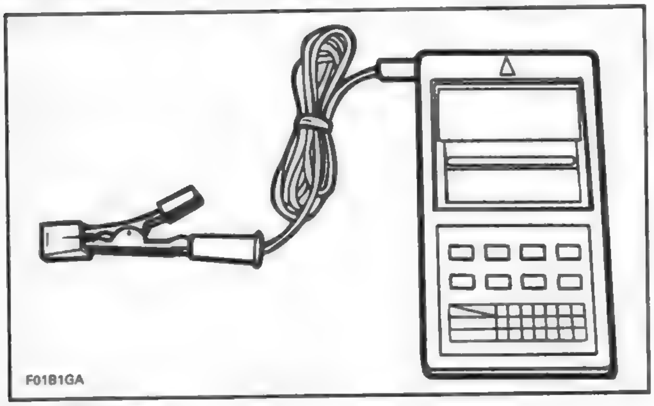
Idle Speed Adjustment

CAUTION: Before starting engine for the idle adjustment, make sure that oil pump is adjusted. The oil pump adjustment must be checked after each time carburetor idle is adjusted. Refer to *LUBRICATION SYSTEM*.

Start engine and allow it to warm.

Adjust idle speed to specifications by turning idle speed screw clockwise to increase engine speed or counterclockwise to decrease it.

Use a digital inductive type tachometer (P/N 529 014 500) to set idle speed.



TACHOMETER

CAUTION: Do not attempt to set the idle speed by using the pilot screw. Severe engine damage can occur.

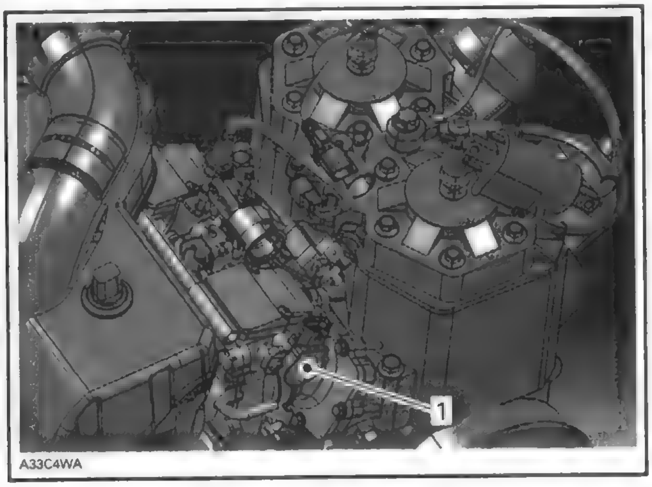
MODEL	IDLE SPEED (RPM ± 200)
500SS	1600
800R	SUMMIT: 1900 Others: 1600

THROTTLE POSITION SENSOR (TPS)

800R

General

The throttle position sensor (TPS) is a potentiometer that sends a signal to the ECM which is proportional to the throttle opening.



1. Throttle position sensor (TPS)

Before replacing the TPS, check the following as these could be causing the fault.

- Throttle cable adjustment too tight or there is not enough free-play. Not returning fully to idle stop.
- Throttle idle set screw is loose or worn.
- TPS is loose.
- Corroded or damaged wiring or connectors.
- Carburetors have been replaced and the **Closed Throttle** reset has not been performed.
- ECM has been replaced and the **Closed Throttle** reset has not been performed.

The ECM may generate several fault codes pertaining to the TPS. Refer to *MONITORING SYSTEM/FAULT CODES* section for more information.

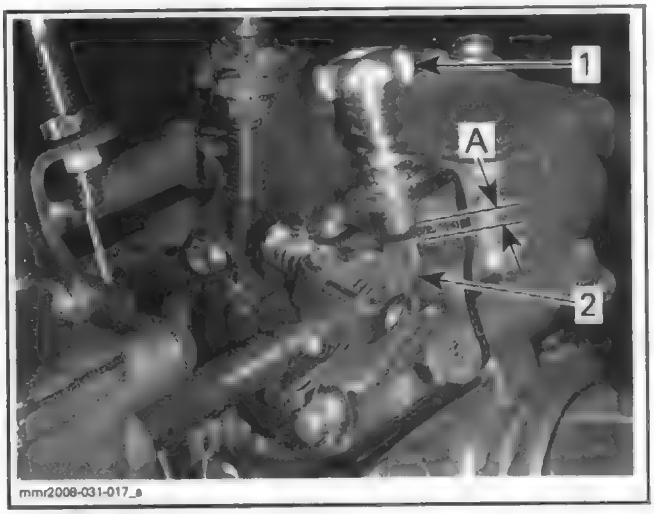
Closed Throttle Reset (TPS)

This reset is very important. The setting of the TPS will determine the basic parameters for all fuel and ignition mappings. An improperly set TPS may lead to poor engine performance.

Reset must be done each time one of the following conditions is met:

- Throttle position sensor (TPS) is loosened or removed.
- Carburetor is replaced.
- ECM is replaced.

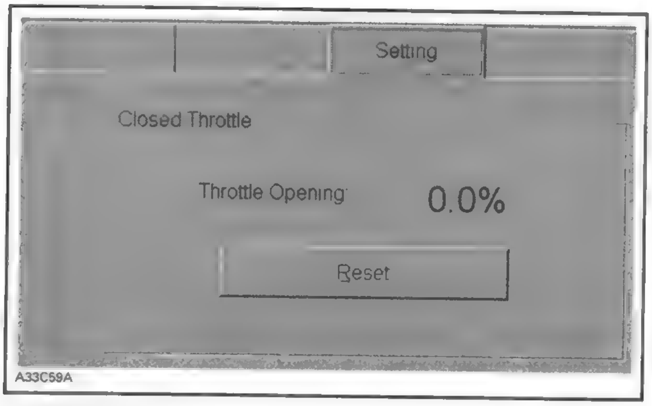
Unscrew idle speed screw until there is a gap between tip of screw and throttle lever stopper.



1. Idle screw
2. Throttle lever stopper
A. Gap required here

Use B.U.D.S. software.

Push the **Reset** button in the **Setting** tab of B.U.D.S.



Closed Throttle

Throttle Opening 0.0%

SETTING TAB

If TPS is not within the allowed range while resetting the **Closed Throttle**, the ECM will generate a fault code and will not accept the setting. Verify the following:

- Ensure throttle cable has enough free-play (flat slides must be closed).
- Throttle position sensor (TPS).

If reset is successful, check throttle cable adjustment.

Adjust idle speed.

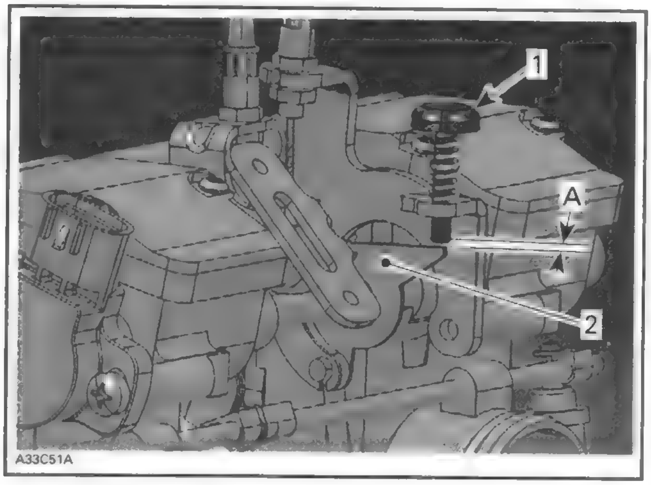
TPS Resistance Test

Disconnect ECM connector.

Unscrew idle speed screw until there is a gap with the throttle lever stopper.

IMPORTANT: Remember to perform the **Closed Throttle Reset** procedure when all tests will be done since the idle screw was loosened for the test.

NOTE: The gap between idle speed screw and stopper is important to ensure throttle slide is completely closed to read TPS resistance values.

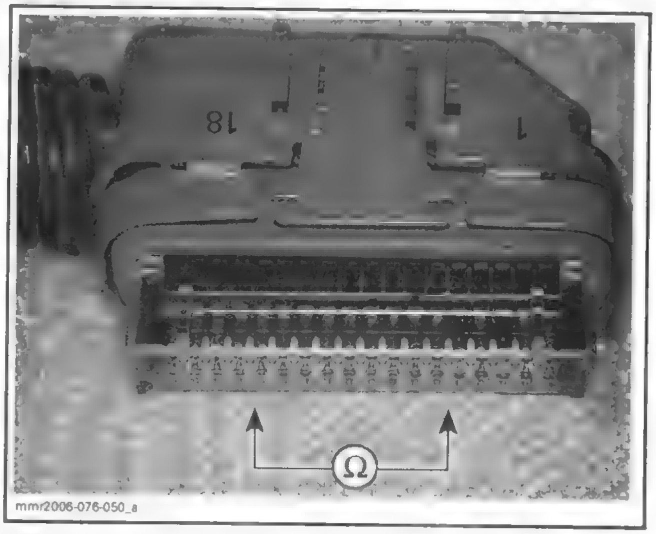


1. Idle screw
2. Throttle lever stopper
A. Gap required here

Activate throttle lever 2 - 3 times to make sure throttle slides are fully closed.

Using a multimeter, check resistance values as per the following table.

ECM CONNECTOR		THROTTLE POSITION	
PIN		IDLE	WIDE OPEN
22	4	3680 - 5520 Ω	480 - 720 Ω
22	1	4000 - 6000 Ω	
4	1	480 - 720 Ω	3680 - 5520 Ω



NOTE: The resistance value should change smoothly and proportionally to the throttle movement. Otherwise, replace TPS.

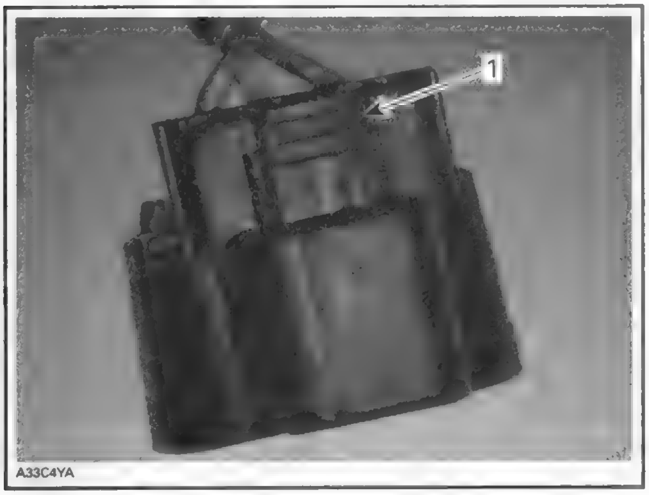
If resistance values are good, perform wear test and voltage test.

If resistance test fails, perform the following continuity test.

CTS Continuity Test

Disconnect TPS connector.

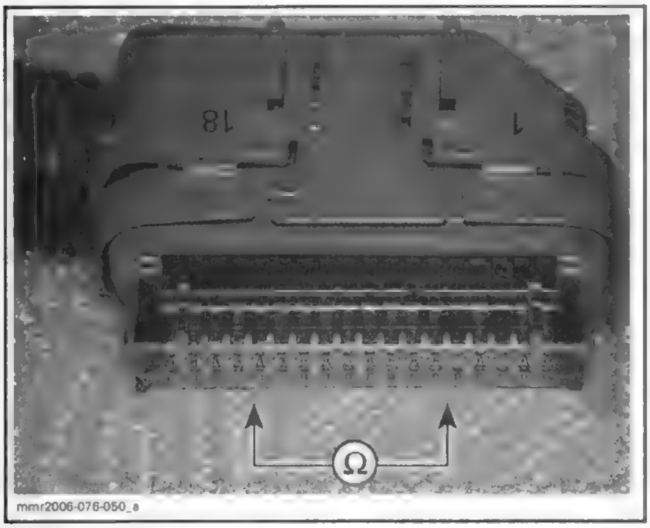
NOTE: To disconnect TPS connector, firmly press locking tab on top outer side of connector to release it.



1. Firmly squeeze here

Disconnect ECM connector and check continuity of wires between TPS connector and ECM connector.

TPS CONNECTOR	ECM CONNECTOR	RESULT
Pin 1	DA-22	Close to 0 Ω
Pin 2	DA-4	
Pin 3	DA-1	



ECM CONNECTOR

If test fails, repair/replace wiring harness.

If test succeeds, check for short-circuit of ECM wiring to ground as follows.

ECM CONNECTOR		RESULT
DA-22	With chassis ground	Open circuit (0L)
DA-4		
DA-1		

If test fails, repair/replace wiring harness.

If test succeeds, perform wear test and voltage test.

TPS Wear Test

While engine is not running, activate throttle and pay attention for smooth operation without physical stops of the cable.

Use B.U.D.S. software.

Use the **Throttle Opening** display under **Monitoring**.

Slowly and regularly depress the throttle. Observe the needle movement. It must change gradually and regularly as you move the throttle. If the needle "sticks", bounces, suddenly drops or if any discrepancy between the throttle movement and the needle movement is noticed, it indicates a worn TPS that needs to be replaced.

TPS Voltage Test

Preparation

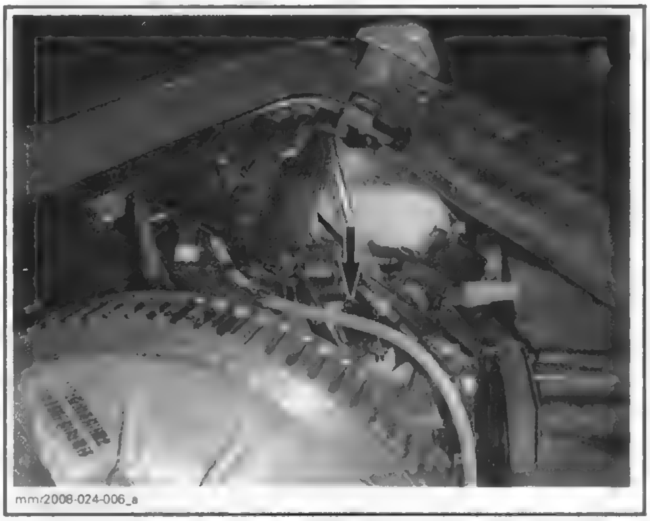
To gain access to TPS, do the following:

- Remove pulley guard. Refer to *DRIVE SYSTEM/BRAKE.*
- Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM.*

Test

Ensure ECM connectors are connected.

Disconnect TPS connector.

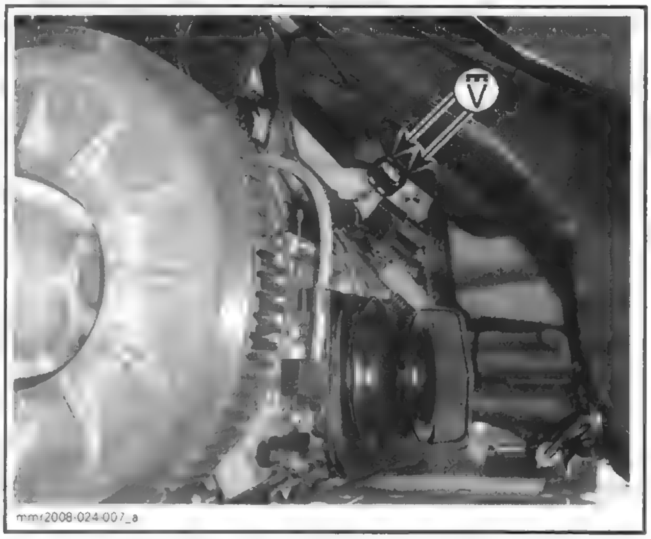


Check the voltage readings from harness connector as follows.

Connect supply harness (P/N 529 035 869) to the 6-pin diagnostic connector of vehicle. Connect supply cable (P/N 529 035 997) to supply harness. Connect clips to vehicle battery. Ensure to match RED wires together and BLACK wires together.

NOTE: On manual start models, use an external 12 V battery.

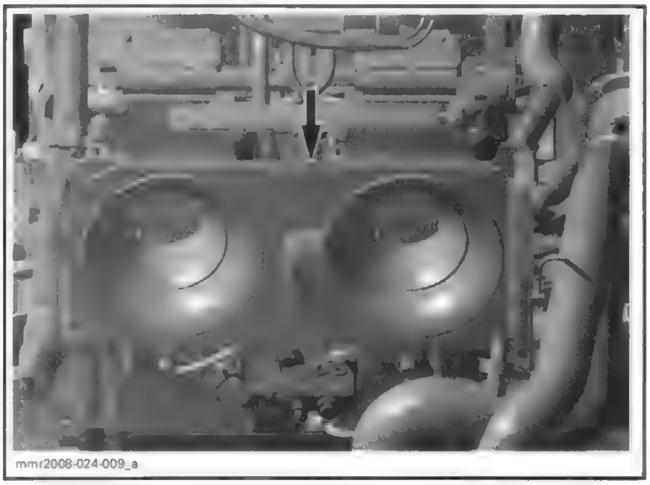
TPS CONNECTOR	VOLTAGE
Pin 1 with pin 3	5.0 Vdc



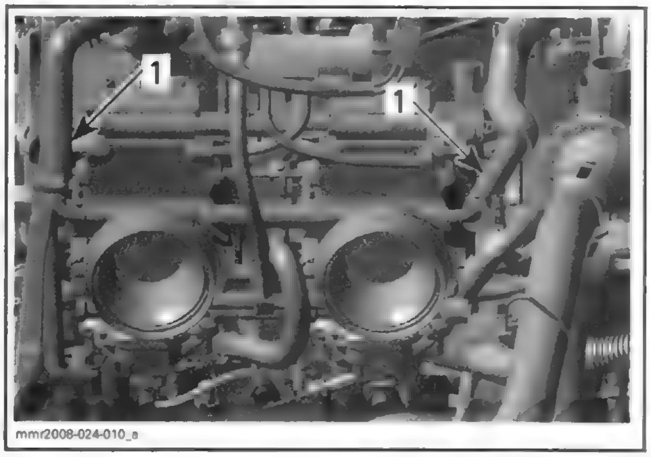
If voltage is not as per specification and all other resistance test were done, try a new ECM.

TPS Replacement

- Remove pulley guard. Refer to *DRIVE SYSTEM/BRAKE.*
- Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM.*
- Remove adapter plate from carburetors.



- Loosen carburetor clamps.
- Install small hose pinchers (P/N 295 000 076) on inlet and outlet coolant hoses connected to carburetors.



1. Install hose pinchers

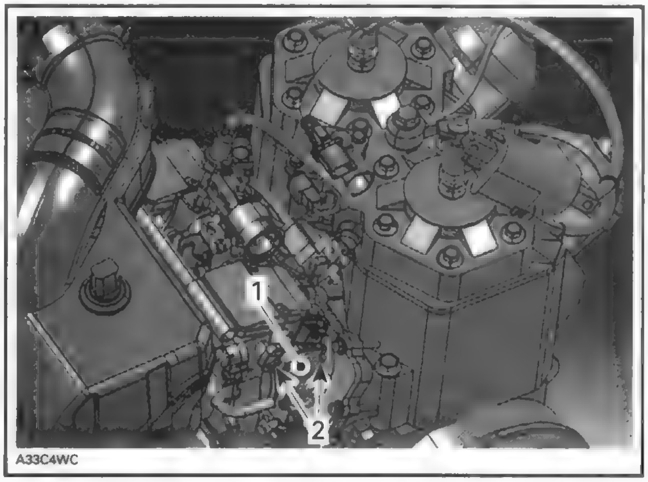
- Disconnect inlet and outlet coolant hoses from carburetors.

NOTE: Keep throttle cable installed to avoid further adjustment.

- Properly rotate and slightly pull out carburetors to gain access to TPS.

Loosen two screws retaining the TPS.

Remove TPS.



CARBURETOR
1. Throttle position sensor (TPS)
2. Screws

Install the new TPS.

Apply Loctite 243 on the TPS retaining screws, then torque to 3 N•m (27 lbf•**in**).

Reinstall remaining removed parts.

Proceed with the **Closed Throttle Reset.**

THROTTLE CABLE

Throttle Cable Removal

NOTE: To be able to disconnect cable end from oil pump, engine must be lifted.

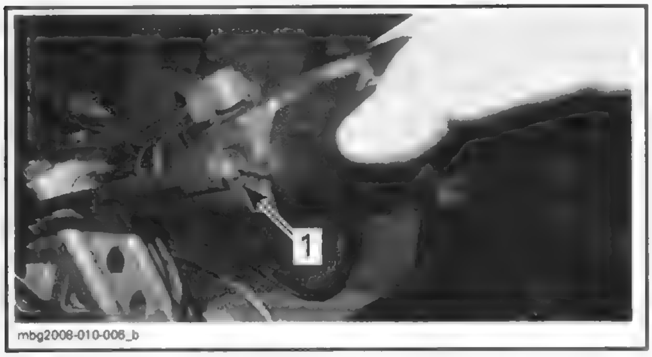
Remove applicable parts to ensure access to oil pump. Refer to *OIL INJECTION PUMP REMOVAL* section for procedures.

NOTE: Before removing the cable from vehicle, note its routing for installation.

Remove steering cover.

Using long nose pliers to hold the cable, push the end of cable out of its location.

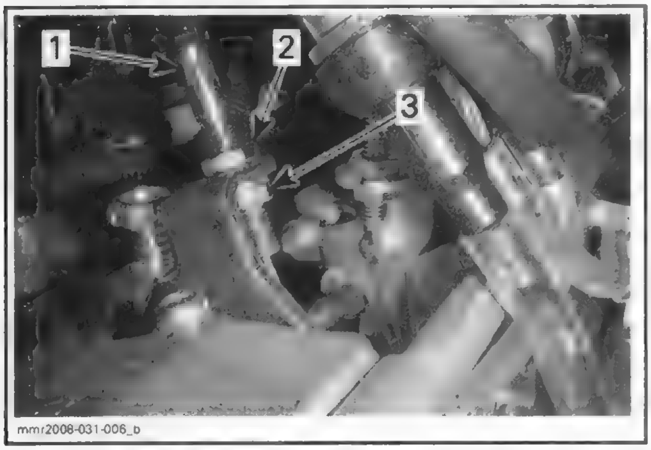
Remove the retaining circlip, keep circlip for re-use.



TYPICAL
1. Circlip

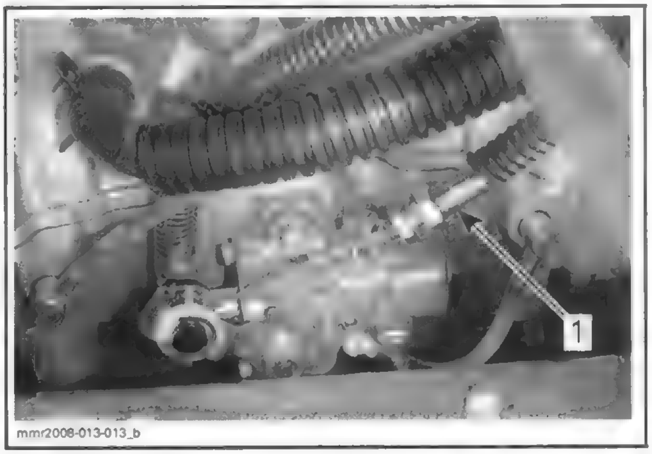
Unhook cable sheath then remove cable from handle.

Disconnect cable and cable end from carburetors.



1. Throttle cable
2. Adjusting nut
3. Locking nut

Disconnect cable from oil pump then remove cable.



1. Throttle cable

Throttle Cable Inspection

Inspect throttle cable and housing for any damage. Replace as necessary.

Throttle Cable Installation

The installation is the reverse of the removal procedure.

CAUTION: Check that throttle cable is routed away from sharp edges, hot or vibrating parts.

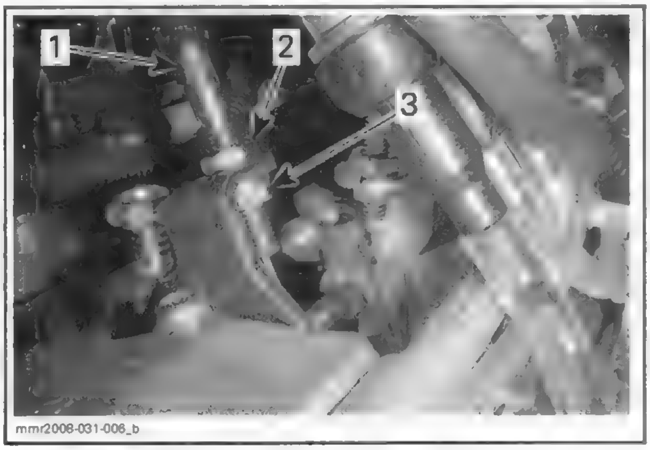
Throttle Cable Adjustment

⚠ WARNING

Ensure the engine is turned OFF, prior to performing the throttle cable adjustment.

Engine must be set in its position, carburetors installed on engine and throttle cable properly routed.

Loosen throttle cable housing adjusting and locking nuts.



1. Throttle cable
2. Adjusting nut
3. Locking nut

500SS

While holding throttle lever in wide open throttle position, use your finger to validate flat side lower edge position inside venturi bore. A small play should be felt. If not, adjust throttle cable accordingly.

Also ensure that, when throttle is released to idle position, the idle adjusting screw end touches its stopper. No tension should be applied to throttle cable.

Adjust oil pump cable, refer to *LUBRICATION SYSTEM.*

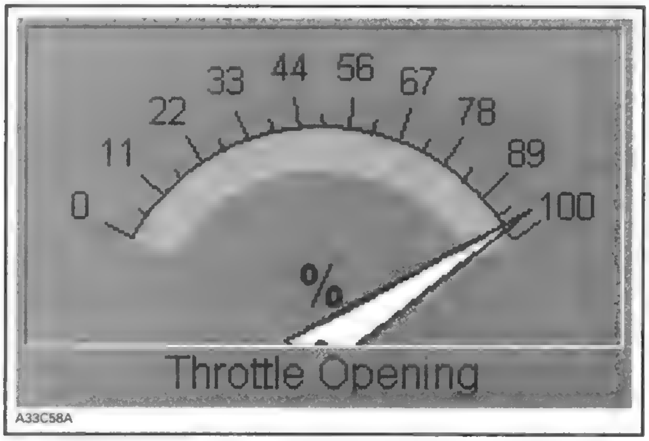
CAUTION: Oil pump cable must be readjusted whenever throttle cable adjustment or idle speed are changed, otherwise serious engine damage may occur.

800R

Perform the wide open throttle position verification as follows.

Use B.U.D.S. software.

In **Monitoring** tab of B.U.D.S., check if throttle opening is within 95 and 100% when throttle lever is fully depressed.



MONITORING TAB

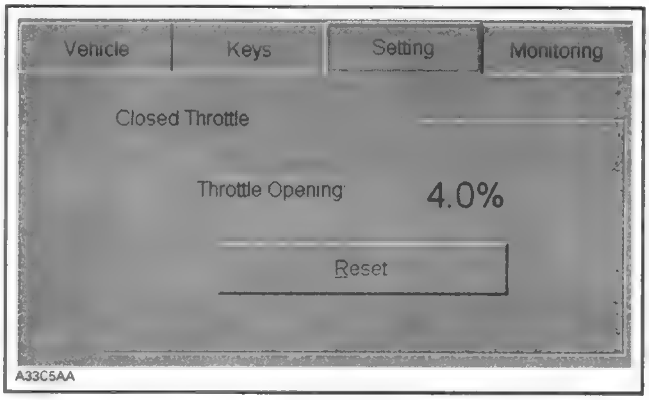
Adjust throttle cable as required to be within this value.

Validate the idle position as follows.

Ensure that some free-play remains in the throttle cable at idle position.

Tighten idle screw until the specified % appears under **Throttle opening** in **Setting** tab of B.U.D.S.

MODEL	THROTTLE OPENING IN B.U.D.S.
MX Z (800R) and GSX (800R)	4%
SUMMIT (800R)	5%



Throttle Opening 4.0%

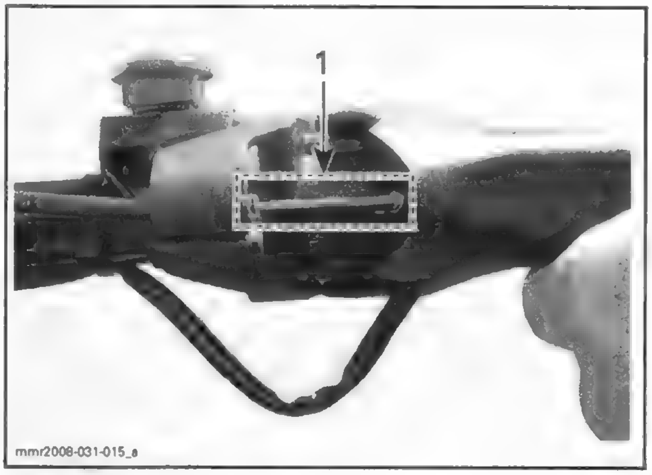
TYPICAL — SETTING TAB

Adjust oil pump cable, refer to *LUBRICATION SYSTEM.*

CAUTION: Oil pump cable must be readjusted whenever throttle cable adjustment or idle speed are changed, otherwise serious engine damage may occur.

Throttle Cable Lubrication

Lubricate exposed portion of cable with dielectric grease (P/N 293 550 004) when throttle handle is at full throttle.



TYPICAL
1. Lubricate

CHOKE CABLE

Choke Cable Removal

NOTE: Before removing choke cable, note its routing for installation.

Remove choke cable nut and pull cable underneath console.

Loosen choke cable housing adjusting and locking nuts.

Remove cable from support.

Disconnect cable barrel from carburetor choke lever.

Cut all locking ties retaining cable and remove it from vehicle.

Choke Cable Installation

The installation is the reverse of the removal procedure.

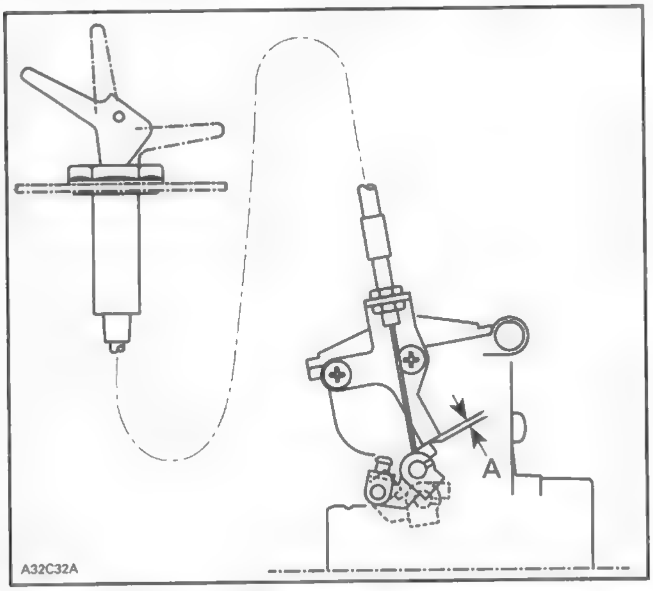
Choke Cable Adjustment

Adjust choke cable as per following procedure:

Loosen choke cable housing adjusting and locking nuts.

While choke lever is fully open, pull choke cable until cam lever reaches the stopper. Tighten cable housing adjusting and locking nuts in this position.

As a confirmation, the gap between the stopper and the cam lever should be within 0 and 0.5 mm (0 and 1/64 in).

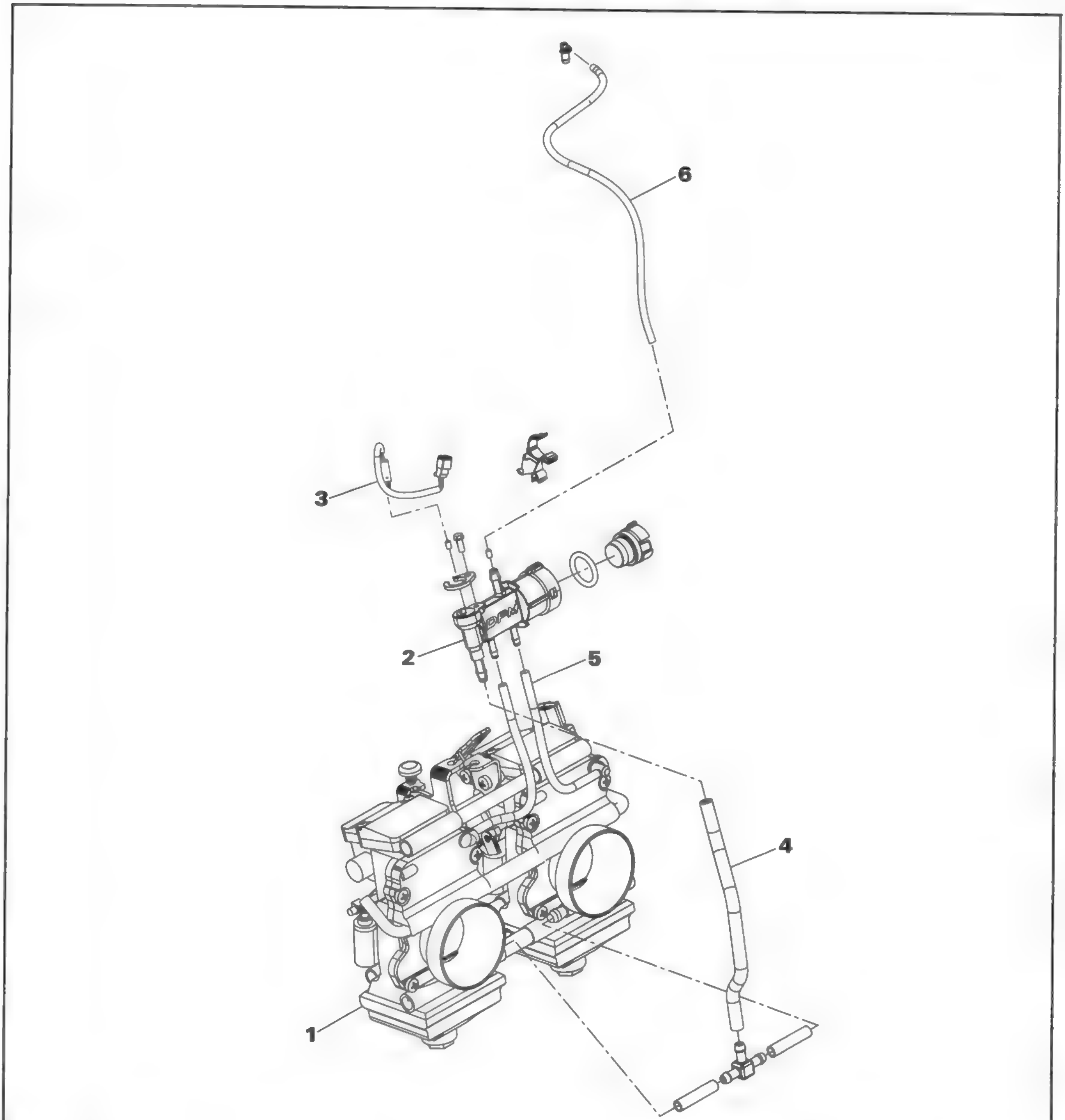


A. Within 0 and 0.5 mm (0 and 1/64 in)

DPM SYSTEM (800R)

SERVICE TOOLS

Description	Part Number	Page
Vacuum/pressure pump	529 021 800	241



1. *TM carburetor*
2. *DPM manifold*
3. *DPM solenoid*
4. *Negative pressure tubes connected to venturi*
5. *Float bowl tubes*
6. *Vent tube connected to air intake silencer*

OVERVIEW

The DPM receives negative pressure created in the carburetor venturi. A solenoid (controlled by ECM) opens the passage, when activated, to decrease the pressure in the carburetor bowls which in turn, lean the fuel mixture.

NOTE: For engine starting and warm-up, the required richer mixture is supplied by a conventional choke (enricher type).

The carburetors are calibrated with the richest jetting required to fulfil the worse operating conditions.

Using predefined maps, the ECM is constantly activating (duty cycle) the DPM solenoid to optimize the air/fuel mixture.

The ECM receives the signals from different sensors which indicate engine operating conditions at millisecond intervals.

The engine RPM (through the trigger coils) and TPS are the primary sensors used to control the DPM. Other sensors (air pressure, air and coolant temperature) are used as secondary inputs.

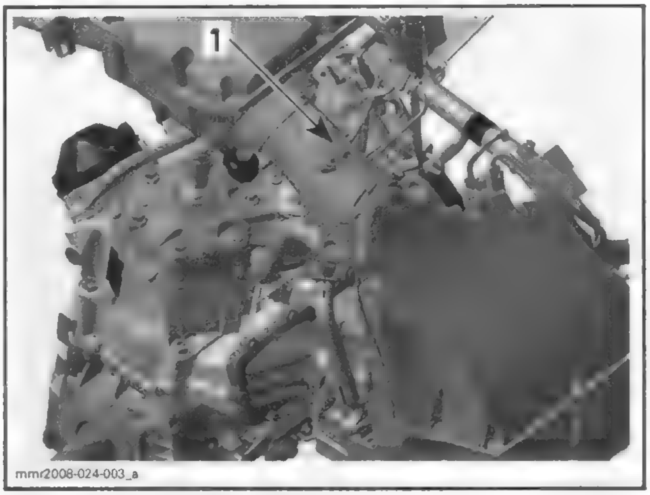
As air temperature and altitude change, the ECM uses its 3D mapping to maintain the air/fuel mixture at an optimum.

The ECM begins to lean fuel mixture when engine RPM is above approximately 3500 RPM.

PROCEDURES

NOTE: It is a good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to *MONITORING SYSTEM/FAULT CODES.*

AIR TEMPERATURE SENSOR (ATS)

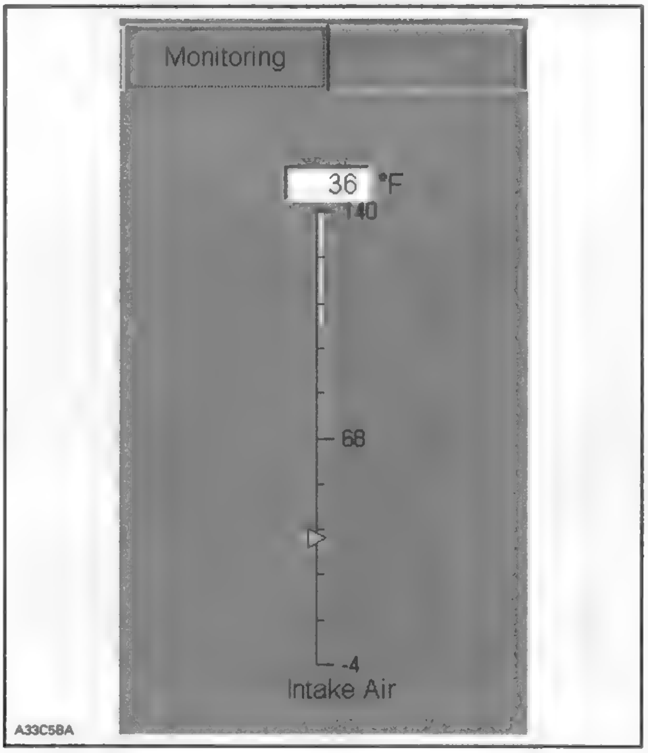


1. *Air temperature sensor (ATS)*

ATS Dynamic Test

Use B.U.D.S. software.

Look **Intake Air** in **Monitoring** tab of B.U.D.S. It should show the ambient temperature. Otherwise, perform the following test.

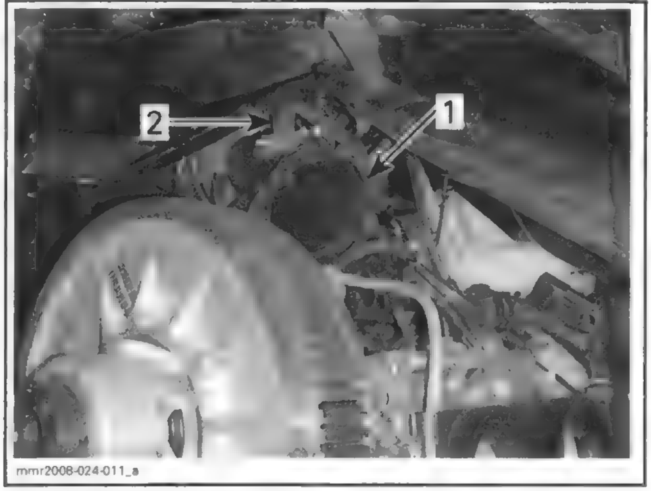


ATS Resistance Test

Remove pulley guard. Refer to *DRIVE SYSTEM/BRAKE.*

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM.*

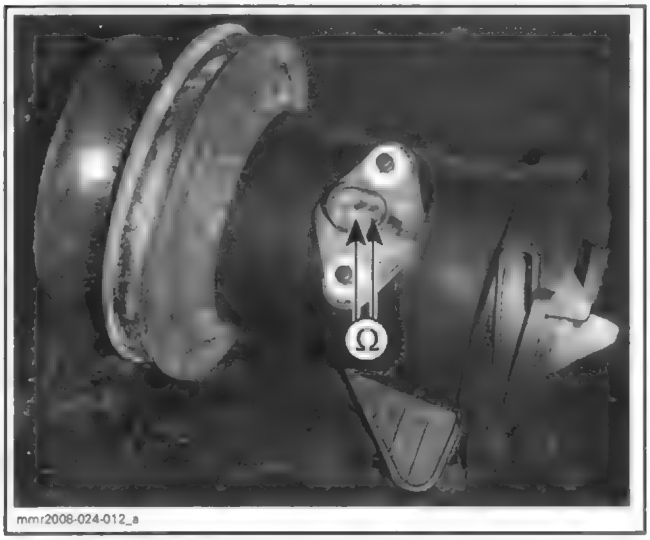
Rotate intake adapter to disconnect ATS sensor connector.



1. Rotate intake adapter
2. Disconnect sensor connector

Measure sensor resistance.

ATS		MEASUREMENT
Pin 1	Pin 2	Refer to *TEMPERATURE SENSOR TABLE* below.



INTAKE ADAPTER REMOVED FOR CLARITY PURPOSE ONLY

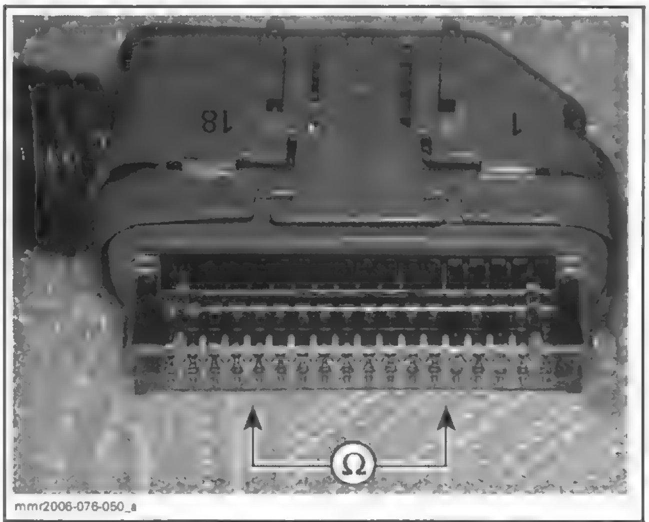
ATS SENSOR TEMPERATURE TABLE		MEASUREMENT
°C	°F	RESISTANCE (Ω)
- 30	- 22	28000
- 20	- 4	14500
0	32	5500
20	68	2500
40	104	1200
60	140	600
80	176	320
100	212	180
130	266	90

If out of specifications, replace sensor.

If resistance tests good, **Reconnect** the ATS and disconnect the ECM connector.

Using a multimeter, measure resistance value as follows.

ECM CONNECTOR		MEASUREMENT
DA-1	DA-19	Refer to *TEMPERATURE SENSOR TABLE* above.



ECM CONNECTOR

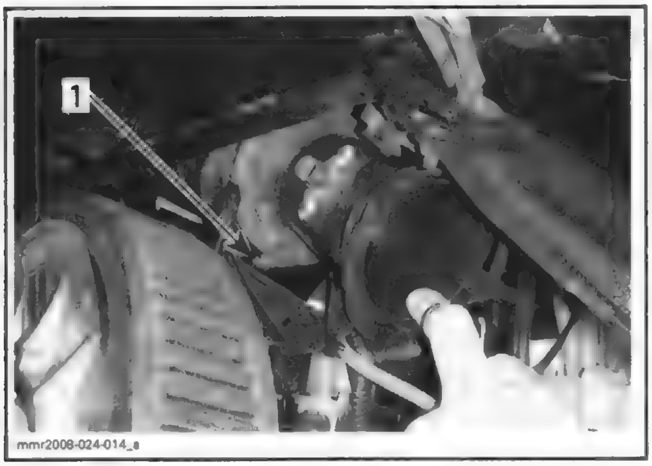
If resistance value is incorrect, repair the connectors or replace the wiring harness between ECM connector and the ATS.

Reinstall removed parts. Ensure intake adapter boot is properly installed on the adapter. See below in *ATS REPLACEMENT.*

ATS Replacement

See procedures above to reach sensor.

Slacken boot clamp.

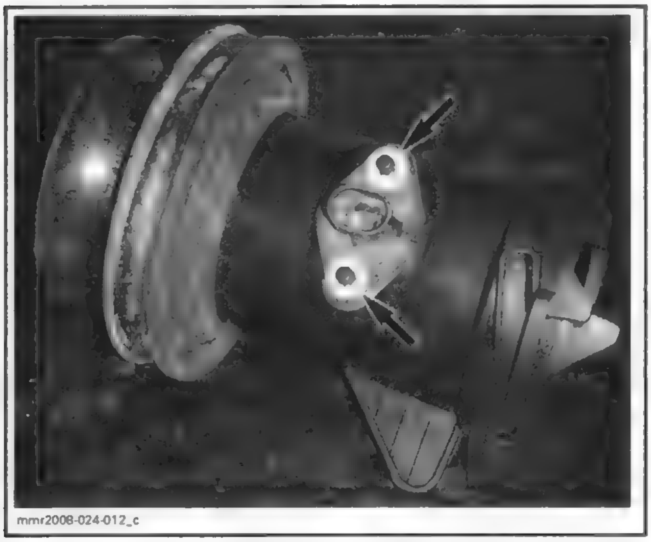

1
mmr2008-024-014_a

1. *Boot clamp*

Unplug ATS connector.

Pull out intake adapter.

Remove sensor push nuts.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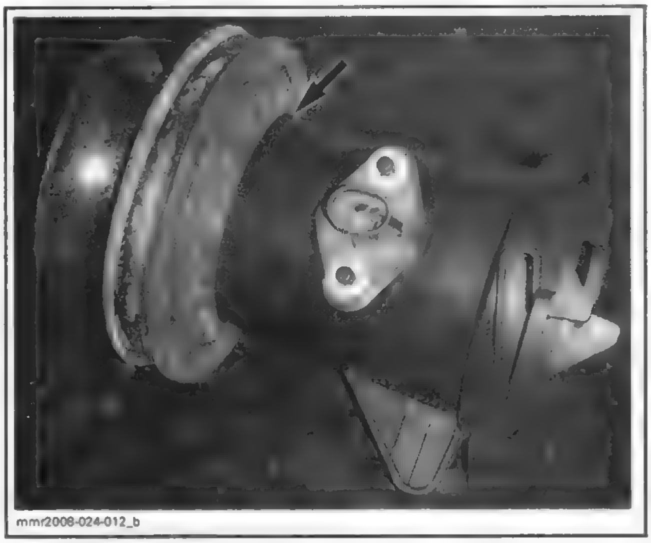
Pull out sensor.

Use new push nuts and secure the new sensor to adapter.

Reconnect ATS.

Ensure adapter boot is properly installed as shown.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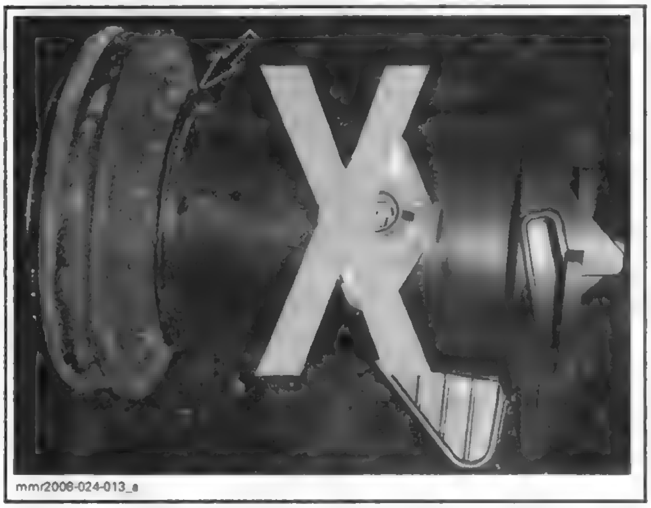
CORRECT BOOT INSTALLATION

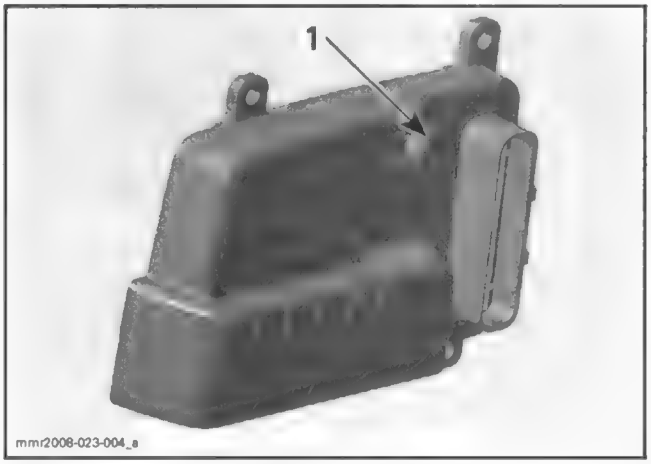

mmr2008-024-013_a

WRONG BOOT INSTALLATION

Reinstall removed parts.

AIR PRESSURE SENSOR (APS)

Sensor is integrated in ECM.

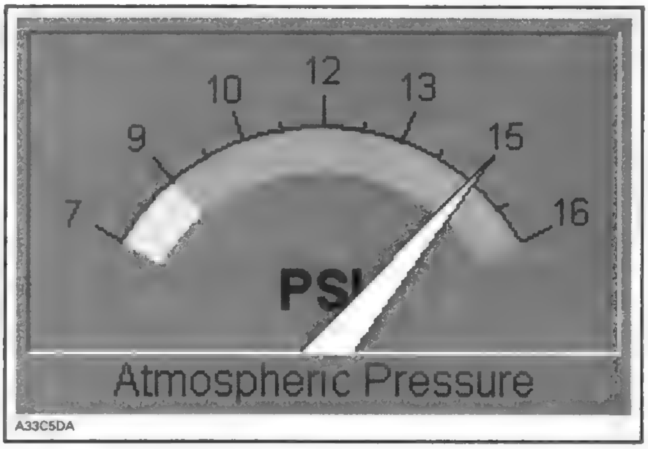

1
mmr2008-023-004_a

1. *Air pressure sensor (APS)*

APS Dynamic Test

Use B.U.D.S. software.

Look **Atmospheric Pressure** in **Monitoring** tab of B.U.D.S. It should show the actual pressure. Otherwise, perform the following.



Ensure pressure orifice is free of snow, ice and dirt. Temporarily remove the orifice filter and clean the area.

Check for fault codes in B.U.D.S.

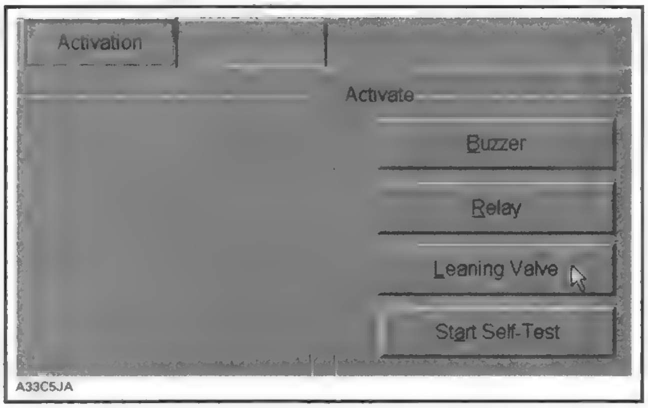
If sensor does not work replace ECM.

DPM SOLENOID

Test with B.U.D.S.

Connect B.U.D.S. software. Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* for proper connection instructions.

Energize **Leaning valve** (DPM solenoid) from **Activation** tab.



ACTIVATION TAB

This will validate the solenoid mechanical and electrical operation.

Listen to or touch relay to feel it clicks.

If the solenoid does not work, check the input voltage at the solenoid connector.

DPM Solenoid Input Voltage Test

Disconnect the connector from the solenoid.

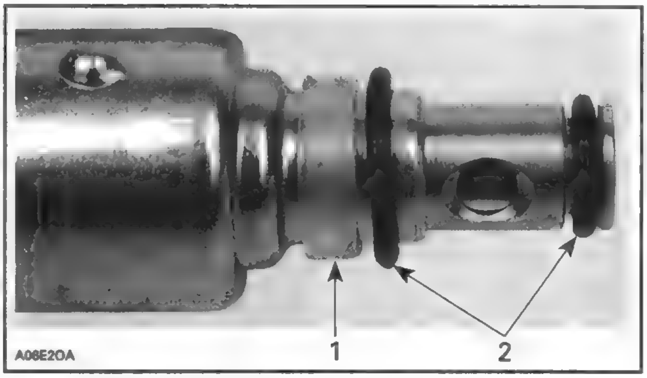
Measure voltage between pin 2 of DPM solenoid on harness side, and battery ground (engine ground on manual start models).

If 12 V is read, disconnect connector from the ECM and check continuity of circuit between pin DA-29 and pin 1. If wire/connector tests good, try a new ECM.

If it does not read 12 V, check the corresponding fuse(s), relay and continuity of circuit DP-2. If continuity is faulty, repair/replace wire/connector.

DPM Solenoid Replacement

At reassembly, ensure that solenoid seals are in place.



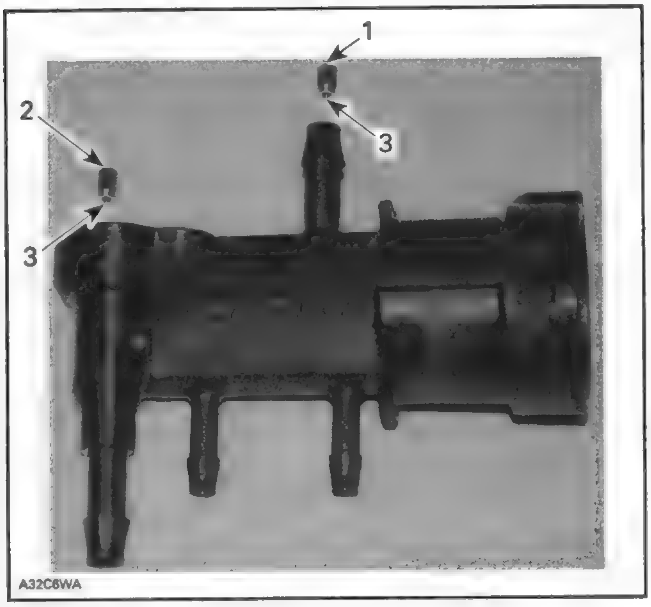
1. *Plastic seal*
2. *O-rings*

DPM MANIFOLD

DPM Manifold Visual Inspection

With DPM manifold removed from vehicle and all hoses disconnected from DPM manifold, inspect for any broken fittings or missing dust caps. If any part is broken, replace DPM manifold.

Ensure jets are positioned with the taper as shown.



1. *Vent jet*
2. *Lean jet*
3. *Taper end here*

Pay also attention not to mix jets. Refer to the following table for the proper inner diameter size. Refer to the illustration above for the jet location.

MODEL	INSIDE DIAMETER mm (in)	
	VENT JET	LEAN JET
800R	1.2 (.047)	2.0 (.079)

Ensure DPM cap O-ring is in good condition. To install cap, firmly push until tabs click and lock on both sides in DPM.

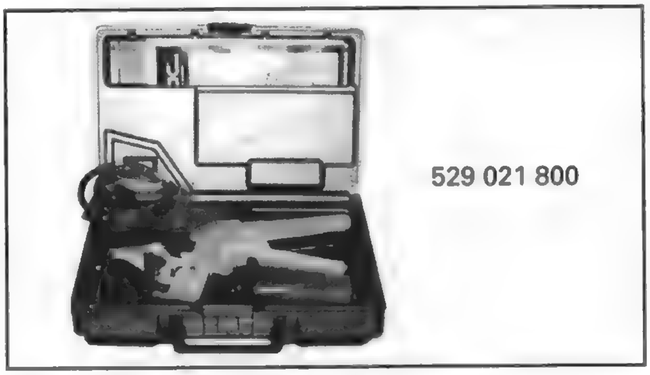
Leak test the DPM manifold.

DPM Manifold Leak Test

Required Items

The following items will be required:

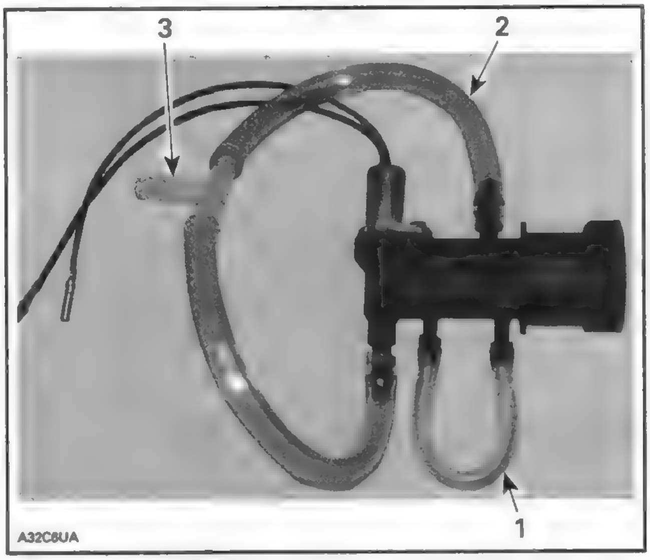
- Water column with at least 350 mm (13-3/4 in) in height
- Vacuum/pressure pump (P/N 529 021 800)



- 4.8 mm (3/16 in) T-fitting
- 6 mm (15/64 in) T-fitting
- 3.5 mm (9/64 in) ID x 100 mm (4 in) hose
- 6 mm (15/64 in) ID x 300 mm (12 in) hose.

DPM Manifold Preparation

Connect hoses as shown.

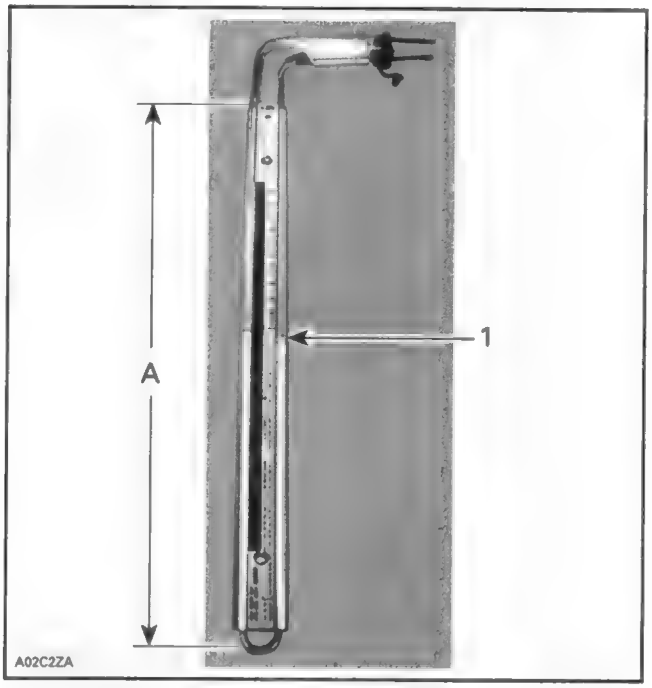


1. *3.5 mm (9/64 in) ID hose*
2. *6.0 mm (15/64 in) ID hose*
3. *6.0 mm (15/64 in) T-fitting*

Water Column Preparation

Mount water column vertically and secure it to a wall or workbench.

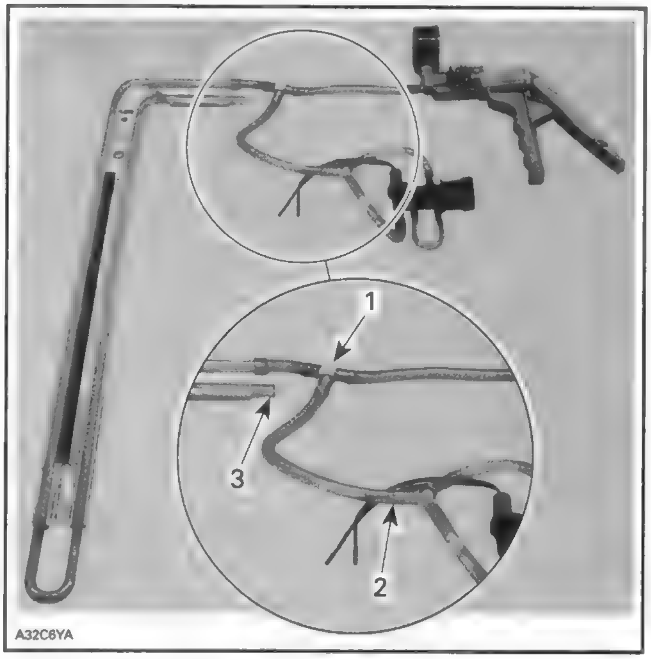
Fill water column to center line (at least 175 mm (6-7/8 in)) in height. Refer to following photo.



1. Center line at 175 mm (6-7/8 in)
A. 350 mm (13-3/4 in)

Connecting the Pump, DPM Manifold and Water Column

Connect hoses as shown.



1. 4.8 mm (3/16 in) T-fitting
2. T-fitting
3. Vented to atmosphere

Collect hose into one of the water column tubes, leave the other tube at atmospheric pressure.

Testing

Set pump to «vacuum».

CAUTION: Never use pump directly on DPM to make a pressure test. The vacuum produced by the pump is too high and would damage DPM components. Use the water column as explained above.

Apply negative pressure (vacuum) until the extremities of the water in the tube attain a difference of 350 mm (13-3/4 in).

Stop pumping and allow water levels to stabilize in tube.

Analysis

RESULT	DPM MANIFOLD CONDITION
Water level remains unchanged	Good
Water level drops slowly to return to an even level in **more than** 10 seconds	Defective
Unable to create any vacuum (water level increases and decreases immediately in tube)	Check your set-up and re-do the test. If still not able to create any vacuum, manifold is defective

If DPM manifold is defective, replace its parts (refer to *PARTS CATALOG*) and retest. If test fails again, replace DPM manifold.

SEMI-DIRECT INJECTION (SDI)

SERVICE TOOLS

Description	Part Number	Page
hose pinchers	295 000 076	262
ECM adapter	420 277 010	246
engine removal hook	529 035 829	267
spark plug lift ring	529 035 830	267
Fluke 111 multimeter	529 035 868	246, 259, 277

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
Pyrex® burette	3075	251
Fluke rigid back probes	TP88	246

SERVICE PRODUCTS

Description	Part Number	Page
dielectric grease	293 550 004	254
anti-seize lubricant	293 800 070	273
Loctite 5910	293 800 081	268
pulley flange cleaner	413 711 809	263

OVERVIEW

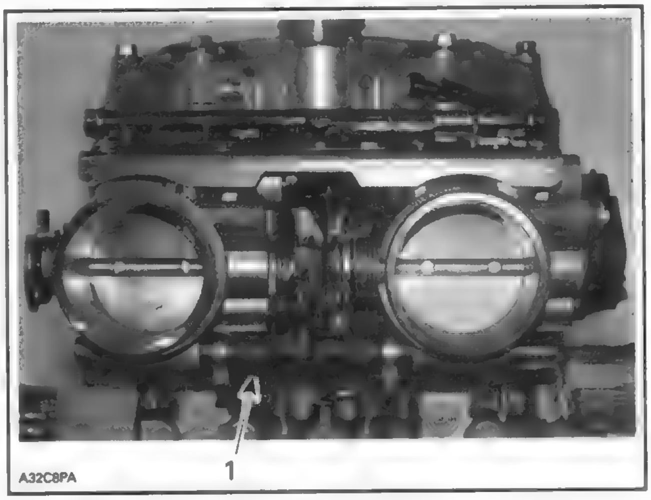
The ECM receives the signals from different sensors which indicate engine operating conditions at milli-second intervals.

Signals from sensors are used by the ECM to determine the injection parameters (fuel maps) required for optimum air-fuel ratio.

The CPS and TPS are the primary sensors used to control the injection. Other sensors are used for secondary input.

Air Induction

Air flows through a filter in the secondary air silencer mounted top of engine. Air pressure is measured at this point. Then, air flows through primary air silencer where its temperature is measured. Then, air is drawn through two throttle bodies mounted on the engine intake side. The air flow is controlled by two throttle plates. Fitted on this dual throttle body, there is a TPS (Throttle Position Sensor) that sends position information to the ECM.



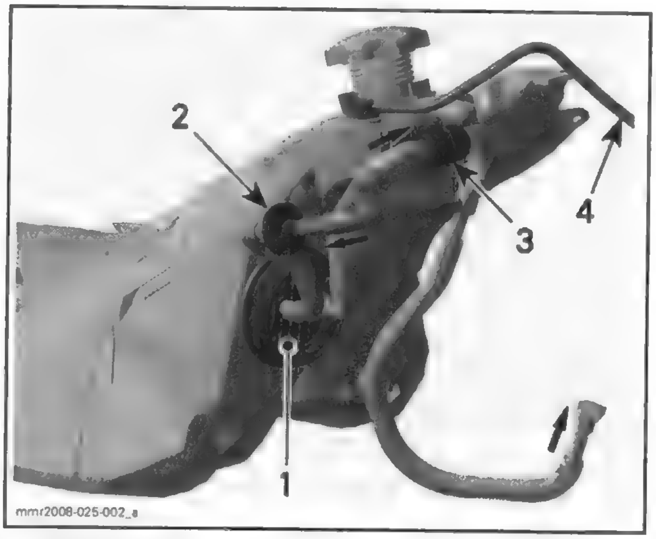
THROTTLE BODY ASSEMBLY
1. Coolant-heated line

The air continues through the reed valves into the cylinder base then the crankcase.

Electric Fuel Pump and Fuel Pressure Regulator

They provide constant fuel pressure to the fuel rail.

The fuel pump module is located inside the fuel tank.



1. *Electric fuel pump*
2. *Fuel pressure regulator*
3. *In-line fuel filter*
4. *Fuel tank vent*

The fuel pressure regulator controls the pressure in the system and allows the excess of fuel to return to the fuel tank. The fuel pressure regulator regulates the fuel pressure at 400 kPa (58 PSI).

In-Line Fuel Filter

The in-line 10 micron fuel filter is fastened under the steering console. It should be replaced as recommended in *MAINTENANCE CHART*.

Fuel Rail

The fuel rail is a small tube on which the four injectors are mounted. It provides fuel at constant pressure to the fuel injectors. The fuel rail is fed by the fuel pump module.

Fuel Injectors

Fuel injectors (two per cylinder) are used to inject fuel into the transfer port of cylinder.

GENERAL PRECAUTIONS

Engine problems are not necessarily related to the semi-direct injection system.

It is important to ensure that the mechanical integrity of the engine and drive system are present:

- Good transmission system operation
- Good engine compression and properly operating mechanical components, no leaks etc.

Check the chart in *TROUBLESHOOTING* section to have an overview of problems and suggested solutions.

When replacing a component, always check its operation after installation.

FUEL SYSTEM

⚠ WARNING

The fuel system of a fuel injection system holds much more pressure than that of a carbureted snowmobile. Prior to disconnecting a hose or to removing a component from the fuel system, follow the recommendation described here.

Use the latest B.U.D.S. software available from BOSSWeb. Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* for proper connection instructions.

Use B.U.D.S. to release the fuel pressure in the system. Look in the **Activation** section.

⚠ WARNING

Fuel lines remain under pressure at all times. Always proceed with care and use appropriate safety equipment when working on pressurized fuel system. Wear safety glasses and work in a well ventilated area. Proceed with care when removing/installing high pressure test equipment or disconnecting fuel line connections. Use the B.U.D.S. software to release fuel pressure prior to removing a hose. Cover the fuel line connection with an absorbent shop rag. Slowly disconnect the fuel hose to minimize spilling. Do not allow fuel to spill on hot engine parts and/or on electrical connectors. Wipe off any fuel spillage in the engine compartment. Fuel is flammable and explosive under certain conditions. Always disconnect battery or remove 30 A fuse prior to working on the fuel system. After performing a pressure test, release the pressure.

Always disconnect battery properly or remove 30 A fuse prior to working on the fuel system. Refer to *BATTERY* section.

Fuel Rail and Hose

Pressure at fuel rail is supplied and controlled by the electric fuel pump.

When a repair is completed, ensure that hose between fuel rail and fuel pump is properly secured in the supports. Then, perform a fuel pressure test. Refer to *FUEL SYSTEM*.

To remove fuel rail, refer to *FUEL INJECTORS* in this section.

⚠ WARNING

Ensure to verify fuel line connections for damage and that NO fuel line is disconnected prior to installing the tether cord cap on the DESS post. Always perform the high pressure test if any component has been removed. The fuel pump is started and pressure quickly builds-up each time the tether cord cap is installed and the START/RER button is depressed (or rewind starter is pulled).

⚠ WARNING

Never use a hose pincher on injection system high pressure hoses.

Drowned Mode (Flooded Engine)

Electric Start Models Only

If the engine does not start and is fuel-flooded, the drowned mode can be activated to prevent fuel injection and to cut ignition while cranking.

Proceed as follows:

With tether cord cap on its post while engine is stopped, press completely and HOLD throttle lever.

Press the START/RER button.

⚠ WARNING

Do not attempt to use the rewind starter. The drowned mode is active only by using the electric starter.

The engine should be cranked for 20 seconds. Release START/RER button and throttle lever.

Restart engine normally.

NOTE: If the engine does not start, it may be necessary to replace the spark plugs.

ELECTRICAL SYSTEM

It is important to check that the electrical system is functioning properly:

- Battery
- Capacitor
- Fuses
- Relays
- DESS
- Ignition (spark)
- Ground connections
- Wiring connectors.

It is possible that a component seems to operate in static condition but in fact, it is defective. In this case, the best way to solve this problem is to remove the original part and replace it with one which is in good condition.

Never use a battery charger to substitute temporarily the battery, as it may cause the ECM (engine control module) to work erratically or not to work at all. Check related-circuit fuse solidity and condition with an ohmmeter. Visual inspection could lead to false results.

⚠ WARNING

All electrical actuators (injectors, fuel pump, ignition coils and starter solenoid) are continuously supplied by the battery when the start button is depressed or if engine is rotated (with the rewind starter). Always disconnect the tether cord cap and the battery prior to disconnecting any electric or electronic parts.

Pay particular attention to ensure that pins are not out of their connectors or out of shape. The troubleshooting procedures cover problems not resulting from one of these causes.

CAUTION: Ensure all terminals are properly crimped on wires and connector housings are properly fastened.

Before replacing an ECM, always check electrical connections. Make sure that they are very tight and they make good contact and that they are corrosion-free. Check if wiring harness shows any signs of scoring. Particularly check ECM ground connections. Ensure that contacts are good and clean. A "defective module" could possibly be repaired simply by unplugging and replugging the ECM. The voltage and current might be too weak to go through dirty wire pins. Check carefully if pins show signs of moisture, corrosion or if they look dull. Clean pins properly and then coat them prior to assembling as follows:

NOTE: Do not apply dielectric grease or other lubricant on the ECM connectors.

If the newly replaced ECM works, try the old one and recheck if it works.

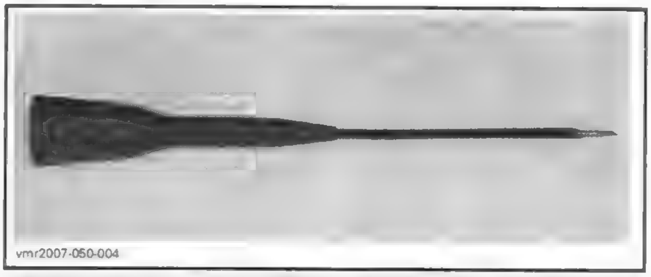
Ensure that all electronic components are genuine — any modification on the wiring harness may lead to generate fault codes or bad operation.

NOTE: For diagnostics purposes, use the latest B.U.D.S. software available from BOSSWeb. Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* for proper connection instructions.

Diagnostic Tools

To perform verifications, use the Fluke 111 multimeter (P/N 529 035 868) should be used.

To easily probe wire terminals through the back of their connectors, use Fluke rigid back probes (P/N TP88) or equivalent. They can be inserted at the end of the standard probes of the Fluke 111 multimeter.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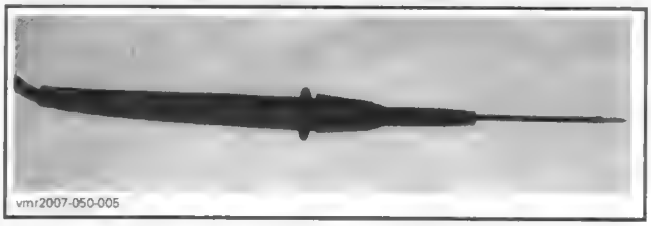
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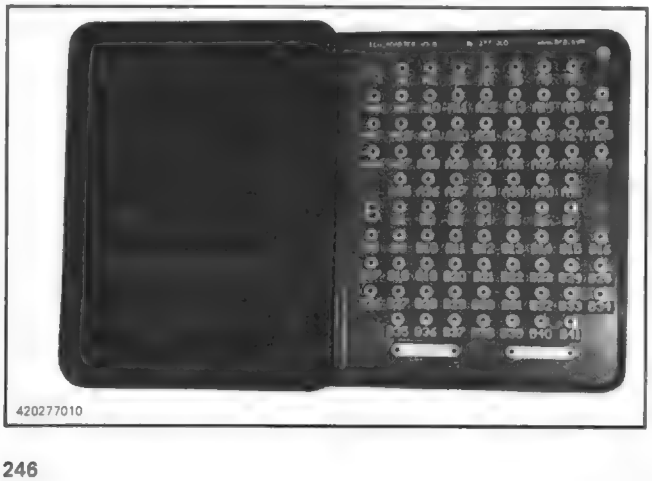
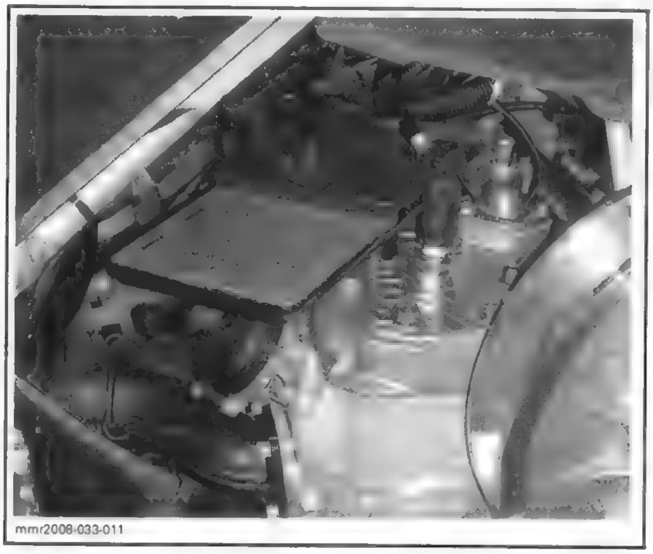
The most recommended and safest method to probe ECM connector terminals is to use the ECM adapter (P/N 420 277 010). This tool will prevent deforming or enlarging terminals which would lead to bad ECM terminal contact creating intermittent or permanent problems.


420277010

Disconnect the desired connector from ECM and reconnect on the tool connector. Probe required terminals directly in the tool holes.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Resistance Measurement

When measuring the resistance with an ohmmeter, all values are given for a temperature of 20°C (68°F). The value of a resistor varies with the temperature. The value for common resistor or windings (such as solenoid) **increases** as the temperature increases. However, our temperature sensors are NTC types (Negative Temperature Coefficient) and work the opposite which means that the value **decreases** as the temperature increases. Use this table for sensor resistive values at given temperature.

TEMPERATURE SENSOR TABLE			
TEMPERATURE		RESISTANCE (OHMS)	
°C	°F	ATS	CTS
- 40	- 40	43610	72412
- 30	- 22	25090	38681
- 20	- 4	14900	21529
- 10	14	9102	12431
0	32	5705	7418
10	50	3680	4582
20	68	2436	2919
25	77	2000	—
30	86	1651	1912
40	104	1144	1284
50	122	808	883
60	140	580	622
70	158	424	448
80	176	316	328
90	194	238	245
100	212	182	186
110	230	141	143
120	248	111	112
130	266	88	88
135	275	—	79
140	284	70	71
145	293	—	64
150	302	57	57
160	320	47	—
170	338	39	—
180	356	32	—
190	374	27	—
200	392	23	—

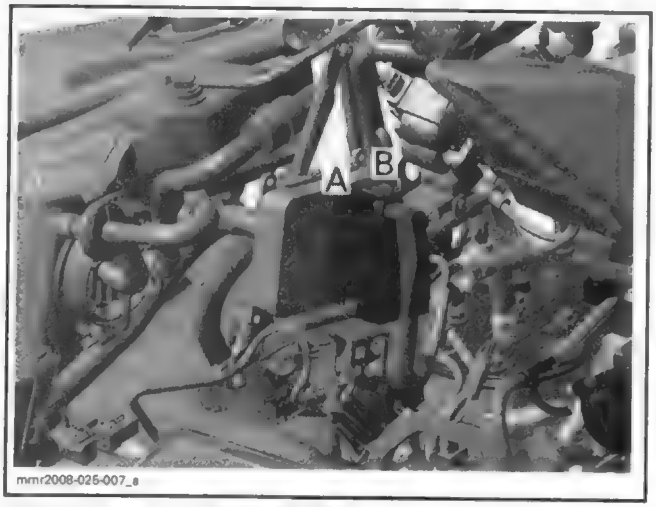
TEMPERATURE SENSOR TABLE		
TEMPERATURE		RESISTANCE (OHMS)
°C	°F	EGTS
- 40	- 40	170
- 20	- 4	185
0	32	201
25	77	220
50	122	239
100	212	276
150	302	313
200	392	349
250	482	385
300	572	420
350	662	454
400	752	488
450	842	521
500	932	554
600	1112	618
700	1292	679
800	1472	738
900	1652	795
1000	1832	849

The resistive value of a temperature sensor may test good at a certain temperature but it might be defective at other temperatures. If in doubt, try a new sensor.

Also remember this validates the operation of the sensor at room temperature. It does not validate the over temperature functionality. To test it, the sensor could be removed from the engine/air silencer and heated with a heat gun (ensure not to heat excessively) while it is still connected to the harness to see if the ECM will detect the high temperature condition and generate a fault code.

A good test would be to put sensor in a container filled with ice and water and measure resistance. Then, boil water and read resistance again. According to the table above, an ATS value would be approximately 5705 Ω with ice/water (0°C (32°F)) and 182 Ω with boiling water (100°C (212°F)).

ECM Connector



ECM "A" AND "B" CONNECTORS

To reach ECM connector:

- Open LH panel.
- Remove pulley guard. Refer to *DRIVE SYSTEM/BRAKE.*

BASIC ADJUSTMENTS

NOTE: These adjustments are not routine maintenance. They should be performed only to solve problems when recommended in procedures of this manual.

IDLE SPEED

Idle speed is controlled by the EMS (Engine Management System) and is **not adjustable**.

If idle speed is not as per specification (refer to *TECHNICAL SPECIFICATIONS*), perform the *CLOSED THROTTLE RESET.*

CLOSED THROTTLE RESET (TPS)

General

This operation performs a reset of the TPS values in the ECM. This reset is very important as the setting of the TPS will determine the basic parameters for all fuel mapping and several ECM calculations for idle speed control of the engine.

TPS reset must be done if:

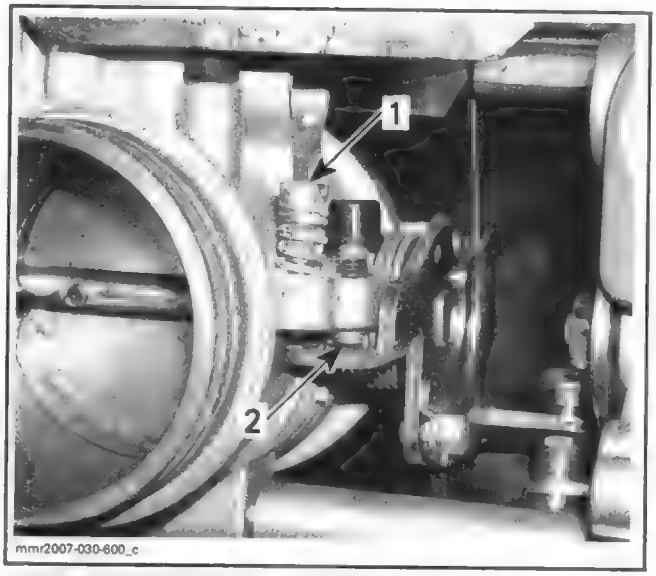
- TPS is loosen, remove or replaced.
- Throttle body is replaced.
- ECM is replaced.

CAUTION: An improperly set TPS may lead to poor engine performance.

TPS Reset

Excessively unscrew idle set screw until there is a contact between stop lever and **zero position screw** (capped).

CAUTION: Do not alter setting of the zero position screw, otherwise throttle body must be replaced.



VIEW BETWEEN THROTTLE BODIES
1. *Unscrew idle set screw **(zero position screw)***
2. *Contact here*

NOTE: If contact cannot be reached, loosen throttle cable. See *THROTTLE CABLE* further.

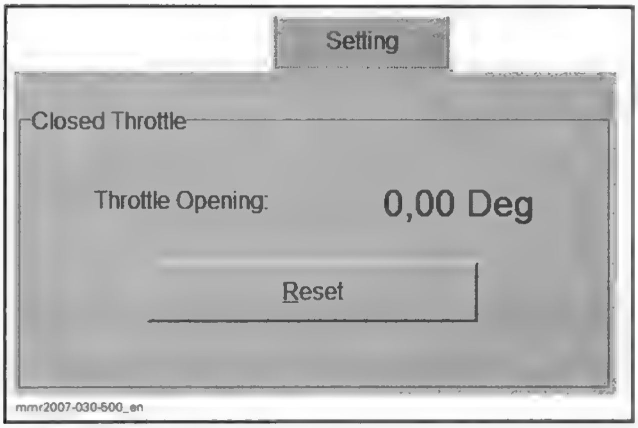
Push throttle lever approximately one quarter then quickly release. Repeat 2 - 3 times to settle throttle plates.

Use the B.U.D.S. software.

The throttle opening displayed in **Setting** tab of B.U.D.S. must be within the following specification.

THROTTLE OPENING
0.0 - 0.1

Press **Reset** button in **Closed Throttle**. See illustration.



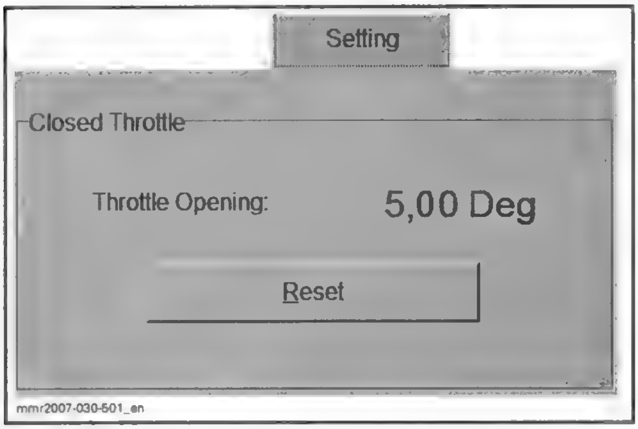
Throttle Opening: 0,00 Deg

NOTE: If TPS is not within the allowed range, the ECM will generate a fault code and will not accept the setting. Check if stop lever rest against the zero position screw as mentioned above. If so, verify the throttle position sensor (TPS).

CAUTION: Do not alter setting of the zero position screw, otherwise throttle body must be replaced.

After reset has been accepted, turn in idle set screw until throttle opening value in B.U.D.S. is within the following specification.

THROTTLE OPENING (IDLE SET SCREW)	
Sea level: below 1800 m (6000 ft)	4.95 - 5.05
High altitude: above 1800 m (6000 ft)	



Throttle Opening: 5,00 Deg

Procedure is completed.

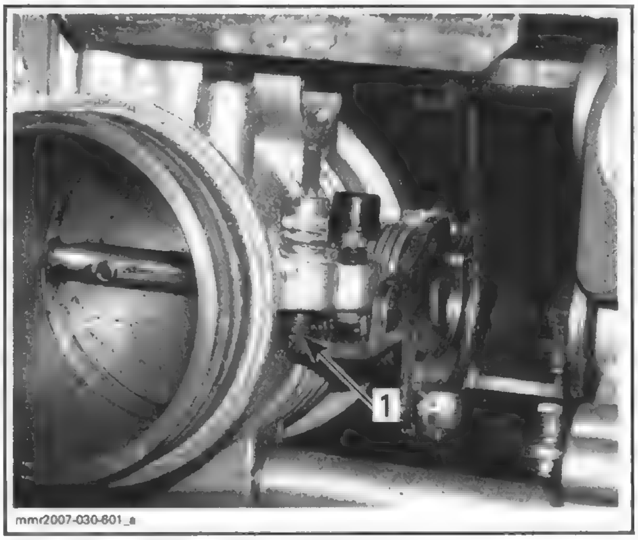
Verify throttle cable adjustment.

THROTTLE CABLE

CAUTION: Do not alter throttle cable routing. It may cause poor startability and erratic idling.

Handlebar and throttle cable must be at their normal position.

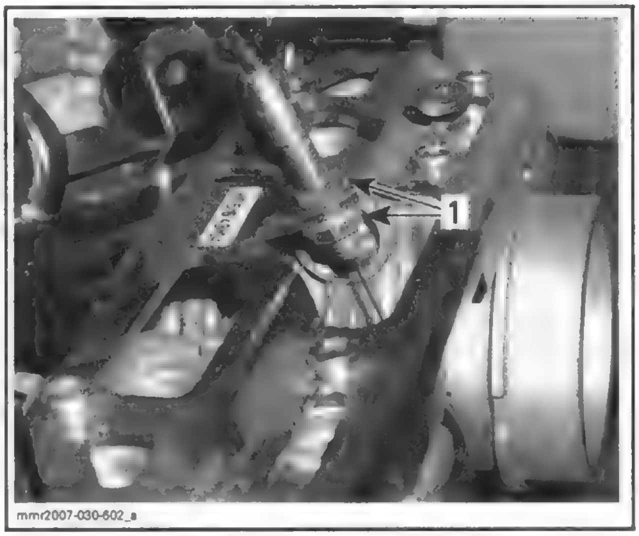
With throttle lever released, ensure there is some free-play in throttle cable to allow a contact between stop lever and **idle set screw**.



VIEW BETWEEN THROTTLE BODIES
1. *Contact here (**idle set screw**)*

Otherwise, loosen throttle cable.

Set cable adjuster nuts accordingly.



1. *Cable adjuster nuts*

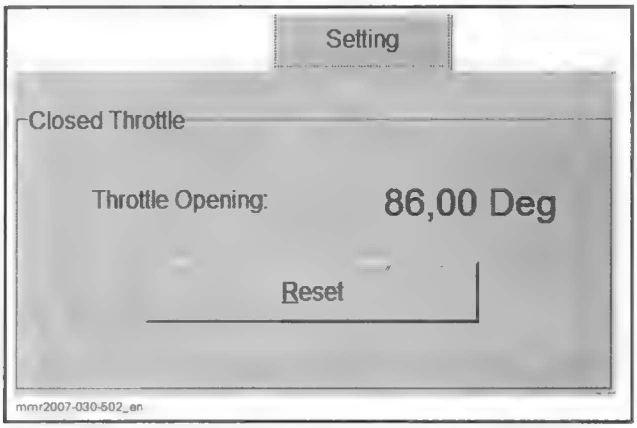
Push throttle lever approximately one quarter then quickly release. Repeat 2 - 3 times to settle throttle plate. Recheck adjustment.

Use B.U.D.S. software.

Perform the wide open throttle (WOT) verification.

The throttle opening displayed in **Setting** tab of B.U.D.S. must be within the following specification.

THROTTLE OPENING (WIDE OPEN THROTTLE)
82 - 86



Closed Throttle

Throttle Opening: 86,00 Deg

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NOTE: If value is below the minimum, tighten throttle cable. If value is above the maximum value, loosen throttle cable.

PROCEDURES

FUEL INJECTORS

Injector Leakage Test and Fuel Flow Measurement

Preparation

First ensure fuel pressure is within specifications.

Remove injectors and fuel rail together from the engine. Refer to *FUEL INJECTOR REPLACEMENT* further in this section as necessary.

NOTE: Do not remove injectors from the fuel rail.

To ensure continuous fuel availability for the test, fill up fuel tank.

Leakage Test

Place each injector in a clean bowl.

Install the tether cord cap on the DESS post and press the engine START/RER button to activate the fuel pump.

Check for fuel leakage from the injector nozzle.

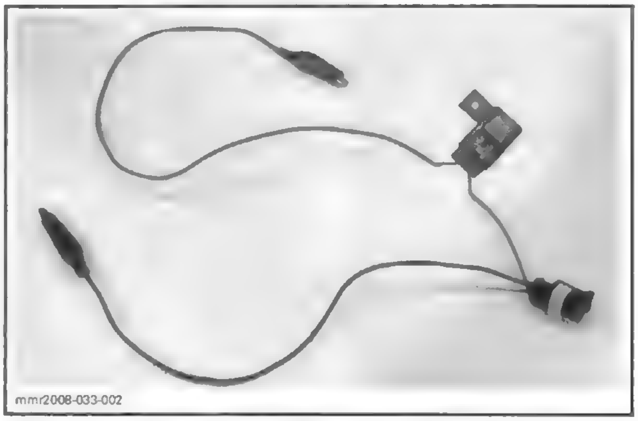
FUEL INJECTOR LEAKAGE	
TEST DURATION	SPECIFICATION
2 minutes	0 - 1 drop per minute

If not within specification, replace the fuel injector(s).

Fuel Injector Flow Measurement

To ensure continuous fuel availability for the test, do the following:

- Fill up fuel tank.
- Build a fused test supply harness as shown. It will be used to continuously feed the fuel pump.



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- Remove back panel of starter rewind handle.

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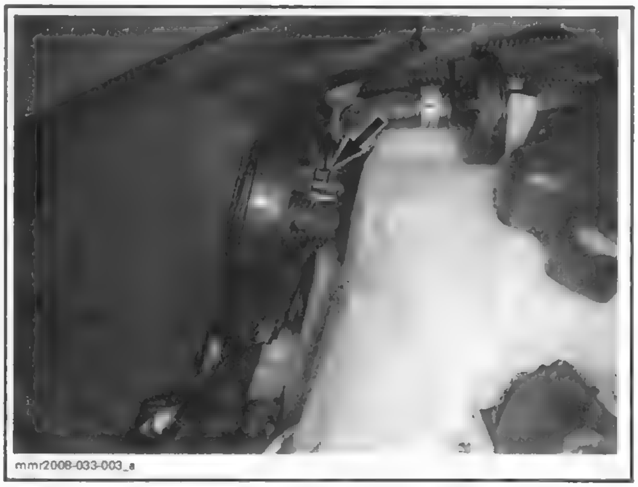
- Disconnect fuel pump connector.



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Use a Pyrex® burette (P/N 3075) graduated for 25 mL (.85 U.S. oz).

Place injector inside top of burette.

NOTE: Disconnect fuel supply tube from fuel rail. Temporarily route tube to move injectors so that the burette can be installed. Reconnect fuel tube to fuel rail.

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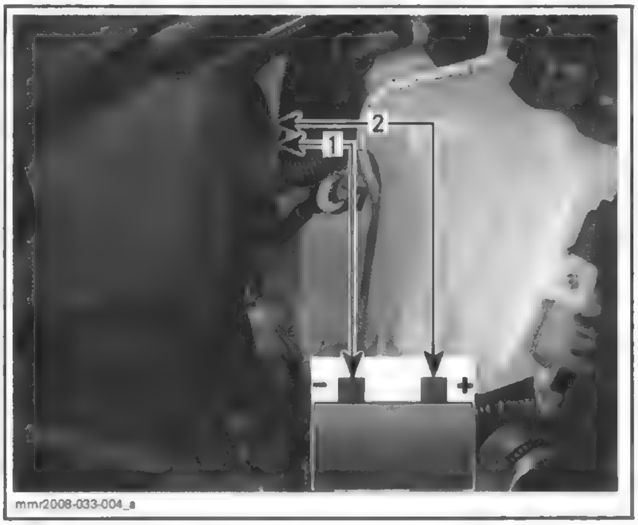
Install the tether cord cap on the DESS post and press the engine START/RER button to wake up the ECM.

Connect the test supply harness between pump and an external battery. Ensure to respect connections polarity.



Use B.U.D.S and energize the appropriate injector under **Injector Flow Measurement** in **Activation** tab.

Measure the fuel volume injected.

Quantity of fuel must be within the following specifications.

INJECTOR	VOLUME of FUEL mL (U.S. oz)
BLUE	16 ± 1 (.54 ±.03)

If an injector is out of specification, retest it 2 - 3 times. If it still fails, replace it.

NOTE: If all injectors fail the test, it is unlikely a failure of injectors. First ensure your reading from the burette is appropriate (pay attention to the division lines). Ensure fuel tank is full. Test for leaks in fuel system, fuel pump pressure and in-line filter condition.

Properly reinstall parts.

Injector Test with B.U.D.S.

Tether cord cap must be on DESS post.

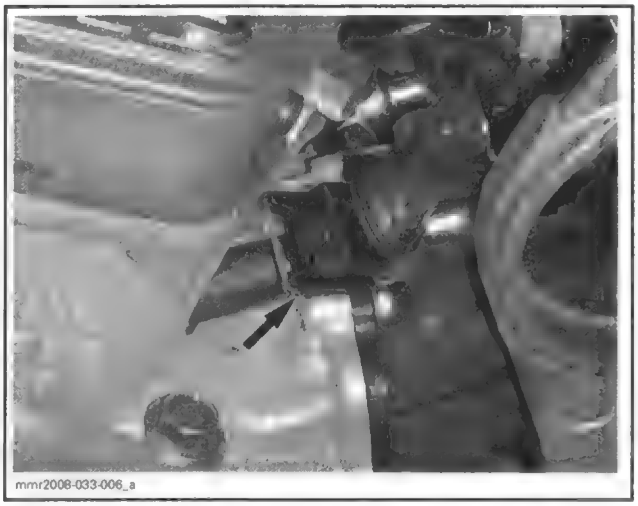
Energize the fuel injector from the **Activation** section.

If the injector does not work, check the input voltage to the injector.

Injector Input Voltage Test

To access injector connector, refer to *INJECTOR REPLACEMENT* procedure further in this section.

Disconnect the connector from the injector.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NOTE: To disconnect the inner injectors, use a small screwdriver and pry out the clip around connector.

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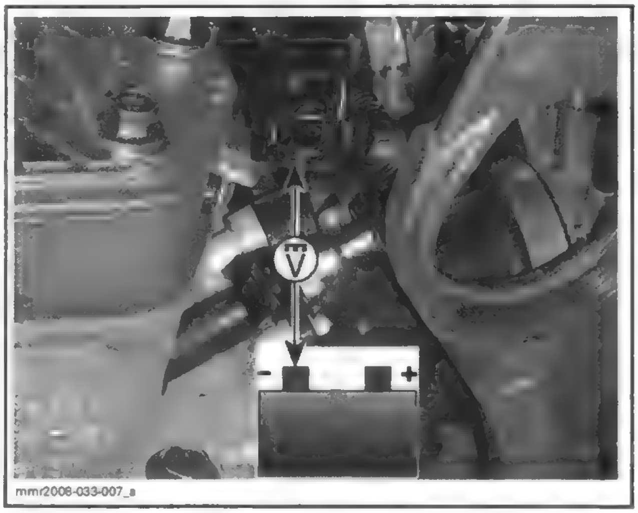
Wake up ECM using START button.

Measure voltage as follows.

INJECTOR CONNECTOR (HARNESS SIDE)		MEASUREMENT
PIN		
1	Battery ground	Battery voltage



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If voltage test is as per specification, check the injector control circuit.

If voltage test is not as per specification, check the corresponding fuse(s), relay 2, diode D1 and continuity of circuit.

Injector Control Circuit Test

Disconnect connector "A" from the ECM and check continuity of control circuit as per following table.

ECM CONNECTOR PIN	INJECTOR	INJECTOR CONNECTOR (HARNESS SIDE)	MEASUREMENT
A-15	MAG outer	Pin 2	Close to 0 Ω (continuity)
A-33	PTO outer		
A-14	MAG inner		
A-30	PTO inner		

If continuity is faulty, repair wiring harness.

If continuity is good, try a new ECM.

Injector Resistance Test

Remove fuse F1 to check outer injectors.

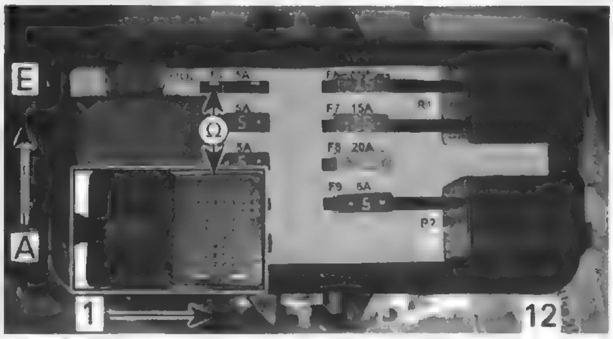
Remove fuse F2 to check inner injectors.

Disconnect "A" connector from ECM.

Ensure injector connector is plugged to injector.

Check injector resistance as follows.

ECM CONNECTOR PIN	INJECTOR	FUSE BOX TERMINAL	MEASUREMENT
A-15	MAG outer	Fuse F1 coordinates: 4E	Approximately 14.5 Ω
A-33	PTO outer		
A-14	MAG inner	Fuse F2 coordinates: 4D	
A-30	PTO inner		



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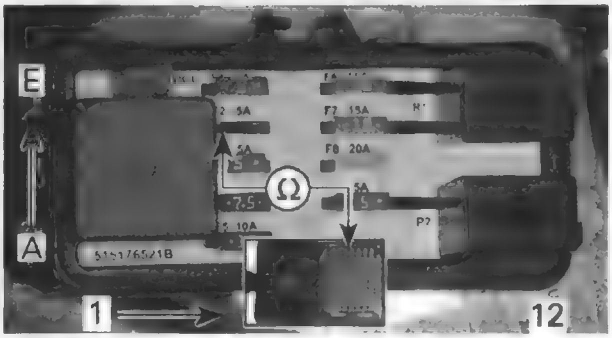
OUTER INJECTORS



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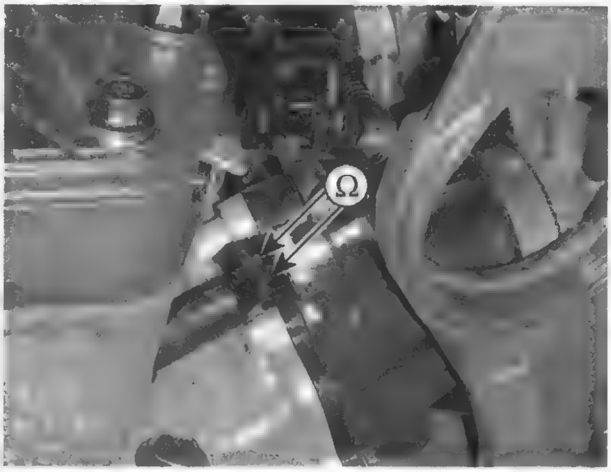
INNER INJECTORS

If measurement is as per specification, injector resistance is good as well as wiring/connectors.

If measurement is out of specification, disconnect injector connector and measure injector resistance on its terminals.

INJECTOR TERMINAL		MEASUREMENT
PIN		
1	2	Approximately 14.5 Ω



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If measurement is as per specification repair/replace injector wiring/connectors.

If measurement is out of specification, replace injector.

If everything tested good and injector does not work, try a new ECM.

Fuel Injector Replacement

Fuel Injector Removal

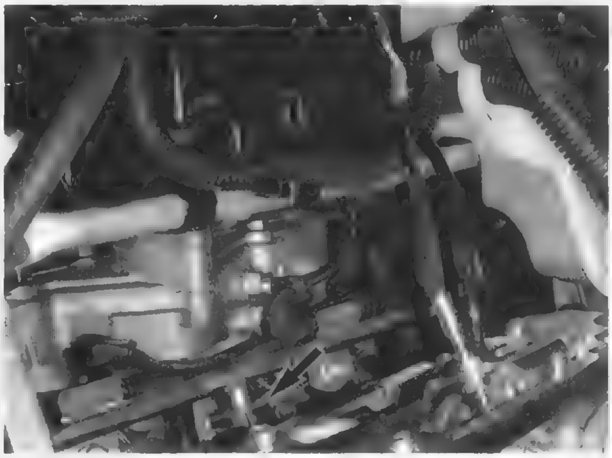
Release the fuel pressure in the system using B.U.D.S. Look in the **Activation** tab.

Remove pulley guard. Refer to *DRIVE SYSTEM/BRAKE*.

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM*.

Remove driven pulley. Refer to *DRIVE SYSTEM/BRAKE*.

Disconnect fuel hose at the fuel rail connector.



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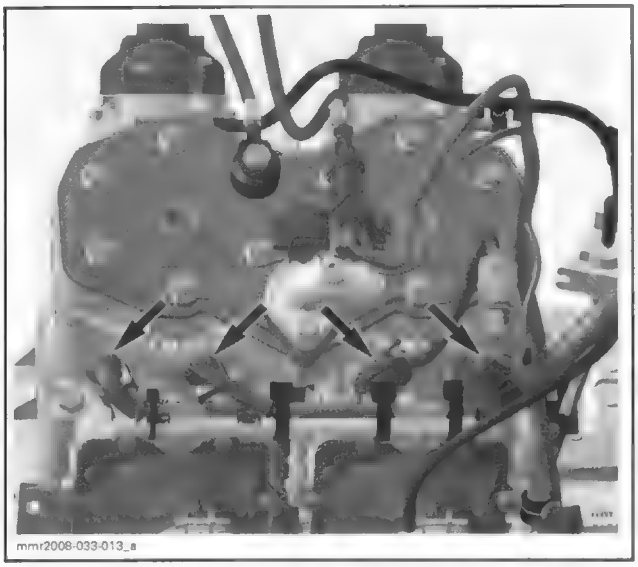
Wrap a rag around the hose end to prevent rail draining.

Disconnect injector connectors.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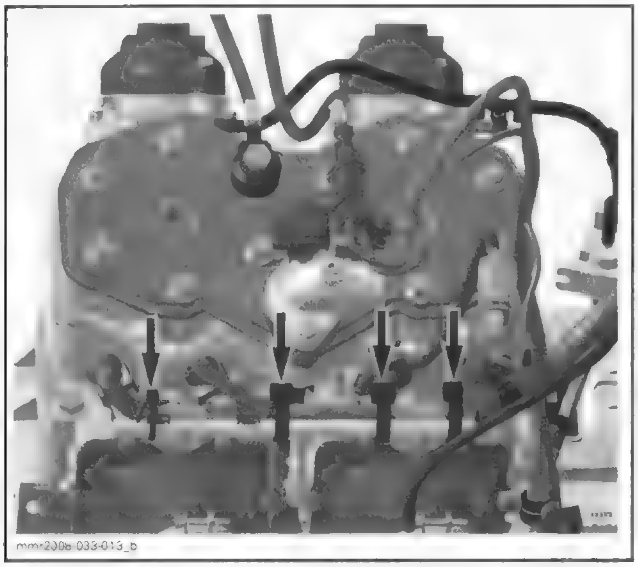
Cut tie raps and remove the wiring harness from the fuel rail.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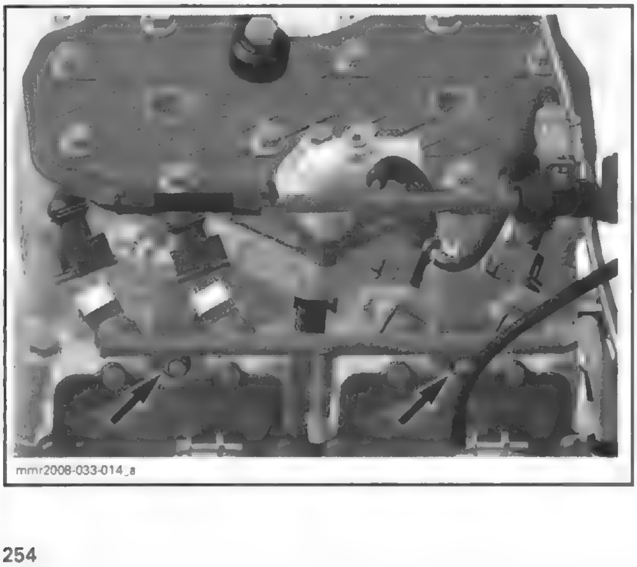
Unscrew rail retaining nuts.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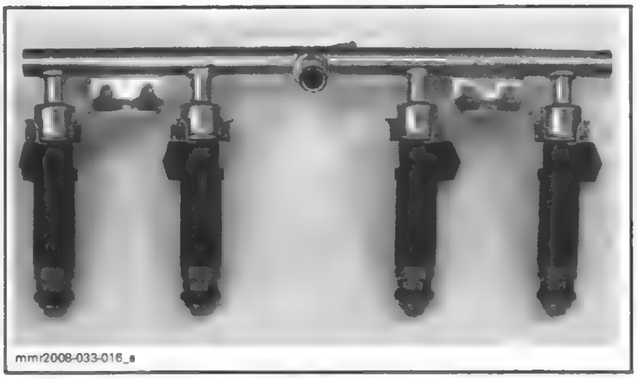
Gently pull rail up by hand, working each side slightly at a time.

Pull rail out with fuel injectors.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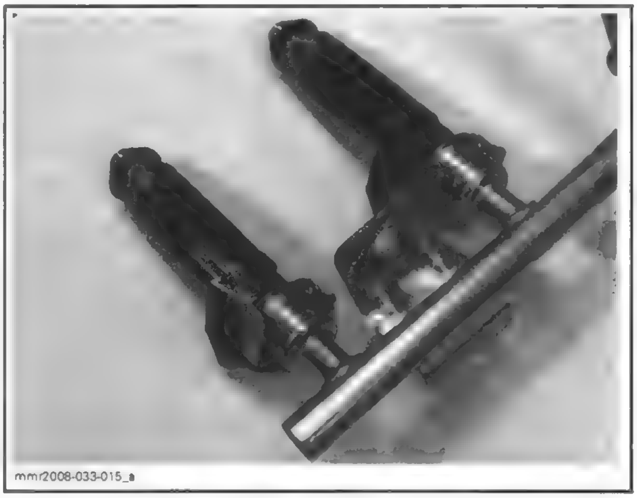
Remove the injector clip.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Pull out fuel injector out of the fuel rail.

Fuel Injector Installation

For the installation, reverse the removal procedure. Pay attention to the following details.

Replace O-rings with new ones.

Apply a thin film of engine oil to O-rings to ease insertion in rail and cylinders.

Insert injectors with your hand. Do not use any tool. Ensure clip and injector are properly installed.

Ensure injectors are not forced against engine.

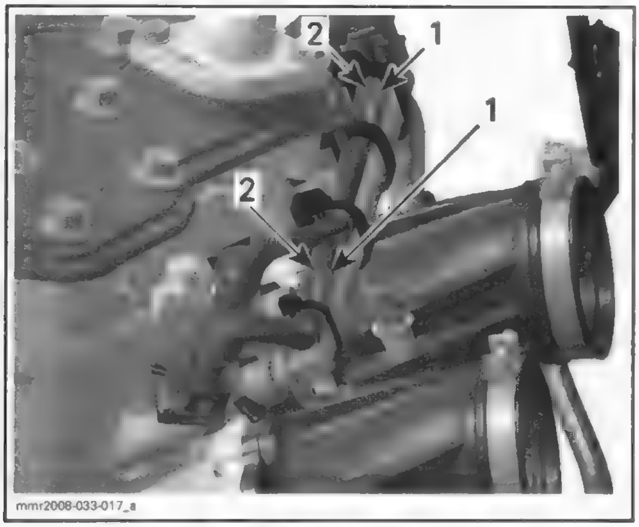
Torque rail retaining nuts to 10 N•m (89 lbf•**in**).

When installing fuel line connector to the fuel rail, put some oil on the O-ring to ease installation.

Add dielectric grease (P/N 293 550 004) to injector electrical connector.

Reconnect fuel injector connectors.

Ensure to position injector wires against fuel rail support tabs shown.


2
1
1
2
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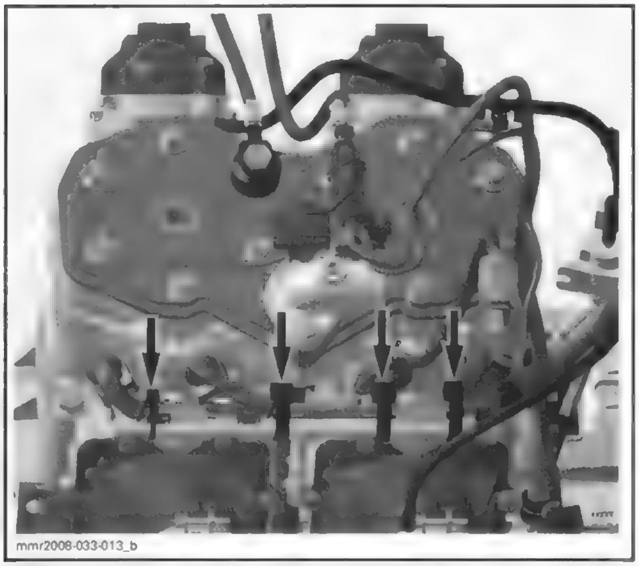
1. *Support tab*
2. *Injector wires on this side*

Attach injector wires with locking ties as shown in following photo.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⚠ WARNING

Ensure wiring harness is away from countershaft.

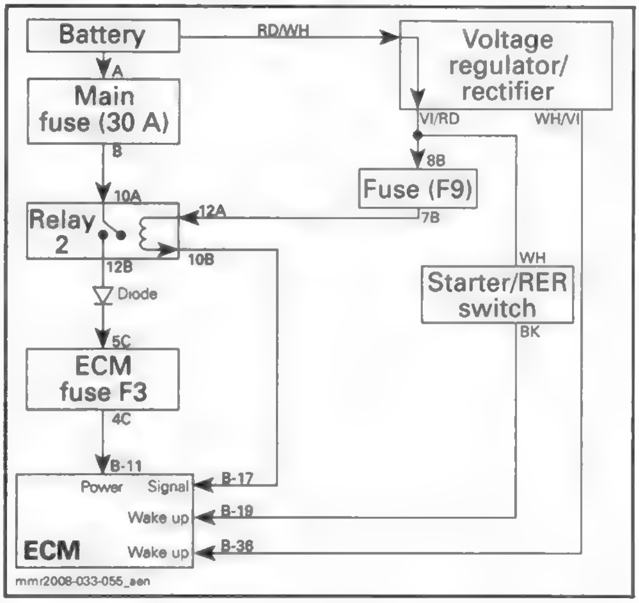
⚠ WARNING

Perform a fuel pressure test and ensure that there is no leak. Refer to *FUEL SYSTEM*. Run engine and check for leaks.

ENGINE CONTROL MODULE (ECM)

NOTE: Prior to replacing an ECM, ensure to conduct all testing procedures.

Power Supply to ECM


Battery
RD/WH
Voltage regulator/ rectifier
A
Main fuse (30 A)
VI/RD
WH/VI
B
8B
Fuse (F9)
10A
7B
12A
Relay 2
12B
10B
WH
Diode
Starter/RER switch
BK
5C
ECM fuse F3
4C
B-11
Power
Signal
B-17
Wake up
B-19
ECM
Wake up
B-36
mmr2008-033-055_aen

ECM POWER SUPPLY PINOUT	
FUNCTION	PIN
Power (Vdc)	11
Signal from voltage regulator to wake up ECM at cranking	36
Ground	1, 2, 9, 32, 41

ECM Power Supply Troubleshooting

TEST	OBSERVATION
Press start/RER button (tether cord on DESS post and cut-out switch in RUN)	Fuel pump turns on for a few seconds
	Multifunction gauge turns on

If components turn on, the ECM is powered.

If the components do not turn on, refer to the following table. Refer to *WIRING DIAGRAMS* to follow circuit descriptions.

TESTS SUMMARY		
CIRCUIT	PROBLEM	ACTION
ECM power circuit	No power to pin B-11 of ECM	Check main fuse
		Check fuse F3 and F9
		Check relay 1
		Check diode D1
		Check wiring/ connectors from battery to ECM
		Check ECM grounds
Relay control circuit	Control signal from ECM pin B-17 is not working	Check relay 1
		Check wiring/ connectors from voltage regulator/rectifier to ECM
		Check ECM grounds
ECM wake up circuit [(1)] (from voltage regulator/ rectifier)	No power to pin B-36 of ECM when engine is turning	Check DC output from voltage regulator/ rectifier
		Check wiring/connectors from voltage regulator/ rectifier to ECM
ECM wake up circuit [(2)] (from START/ RER switch)	No power to pin B-19 of ECM when pressing START/RER button	Check fuse F9
		Check start/RER switch. Refer to *STARTING SYSTEM*
		Check wiring/connectors from voltage regulator/ rectifier to ECM

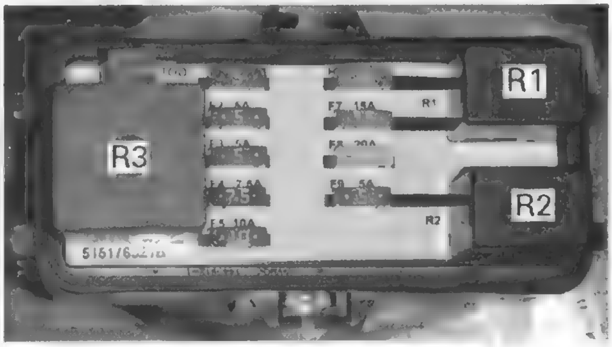
[(1)] This circuit is used to wake up the ECM when engine is started manually.

[(2)] This circuit is used to wake up the ECM when START/RER button is used.

ECM Power Circuit Test

Disconnect ECM connector "B".

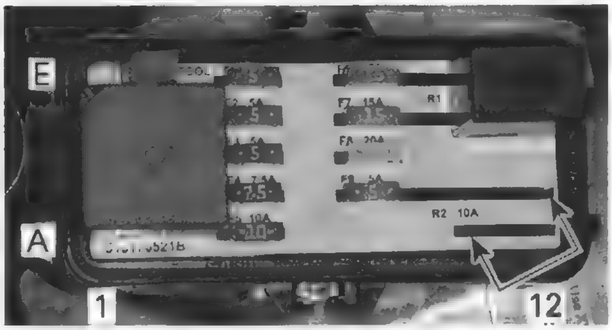
Remove relay 2 from fuse box.



mmr2008-033-056_a

Install an appropriate jumper between terminals as per table.

FUSE BOX TERMINAL COORDINATES	
10A	12B



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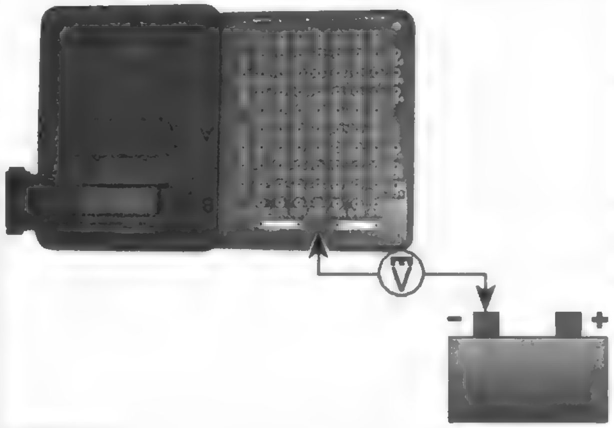
Use a multimeter and set to Vdc.

Read voltage.

ECM CONNECTOR "B"		MEASUREMENT
PIN		
B-11	Battery ground	Battery voltage



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If voltage is out of specification, check wiring/ connectors from battery to ECM.

If voltage is as per specification, check ECM grounds.

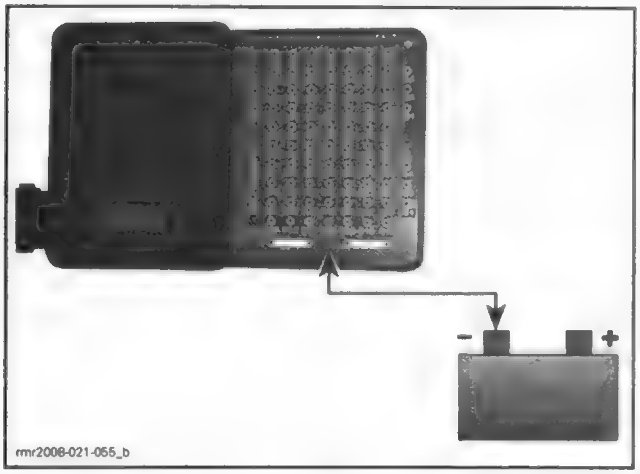
Remove jumper and reinstall relay.

Relay 1 Control Circuit Test

Disconnect ECM connector "B".

Install an appropriate jumper as per table.

ECM CONNECTOR "B"	
B-17	Battery ground



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If relay does not click, check wiring/connectors of relay control circuit from voltage regulator/rectifier to ECM.

If relay clicks and works, check ECM grounds.

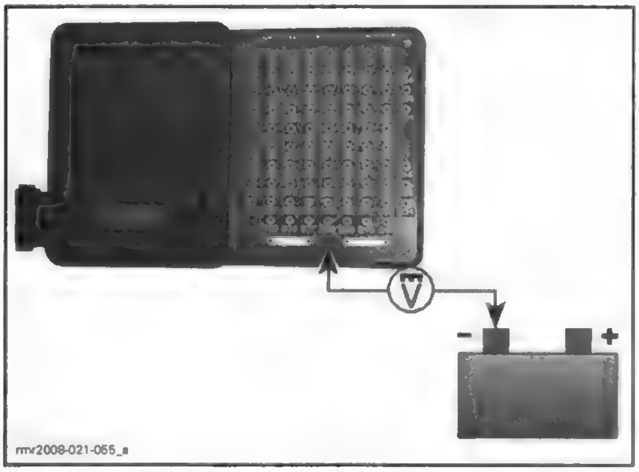
ECM Wake up Circuit Test (from voltage regulator/rectifier)

Disconnect "B" connector from ECM.

Use a multimeter and set to Vdc.

While cranking, read voltage as follows.

ECM CONNECTOR "B"		MEASUREMENT
PIN		
B-36	Battery ground	Battery voltage



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If voltage is out of specification, check the output voltage from the regulator/rectifier as follows:

Remove pulley guard. Refer to *DRIVE SYSTEM/ BRAKE*.

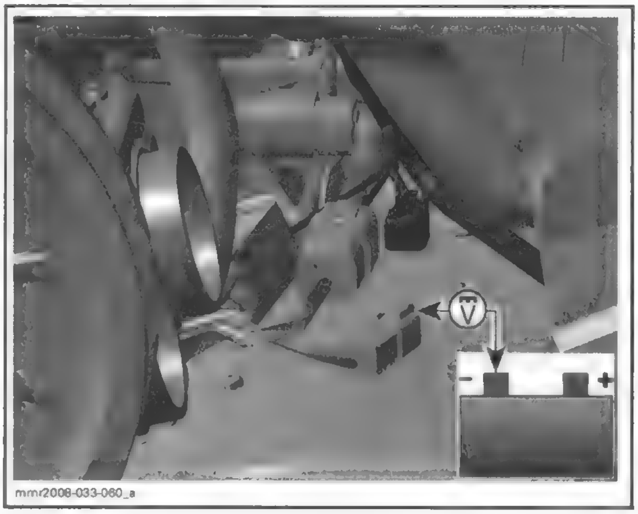
Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM*.

Disconnect the DC output 2-pin connector from voltage regulator/rectifier.

mmr2008-035-012_b

While cranking, read voltage from voltage regulator/rectifier as follows.

VOLTAGE REGULATOR/RECTIFIER CONNECTOR		MEASUREMENT
WIRE		
WHITE/VIOLET	Battery ground	Battery voltage



mmr2008-033-060_a

If voltage is as per specification, check wiring/ connectors from voltage regulator/rectifier to ECM.

If voltage is out of specification, replace voltage regulator/rectifier.

Reinstall removed parts.

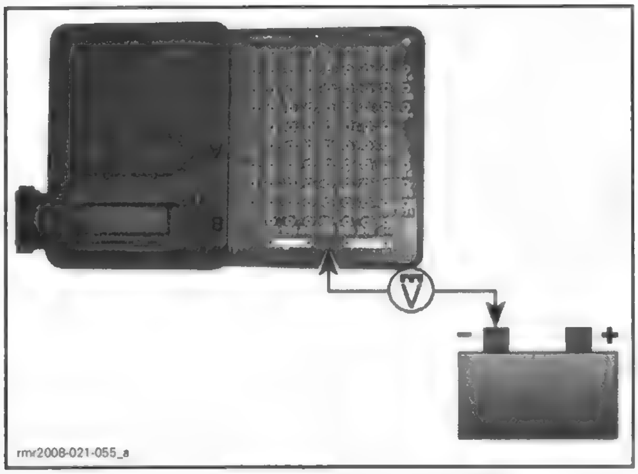
ECM Wake up Circuit Test (from START/RER switch)

Disconnect "B" connector from ECM.

Use a multimeter and set to Vdc.

While pressing START/RER button, read voltage as follows.

ECM CONNECTOR "B"		MEASUREMENT
PIN		
B-19	Battery ground	Battery voltage



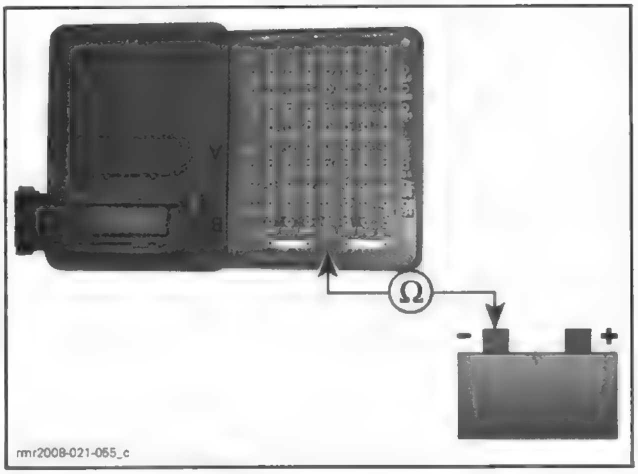
If voltage is out of specification, check START/RER switch (refer to *STARTING SYSTEM.* If switch tested good, check wiring/connectors from voltage regulator/rectifier to ECM.

ECM Grounds Test

Disconnect "B" connector from ECM.

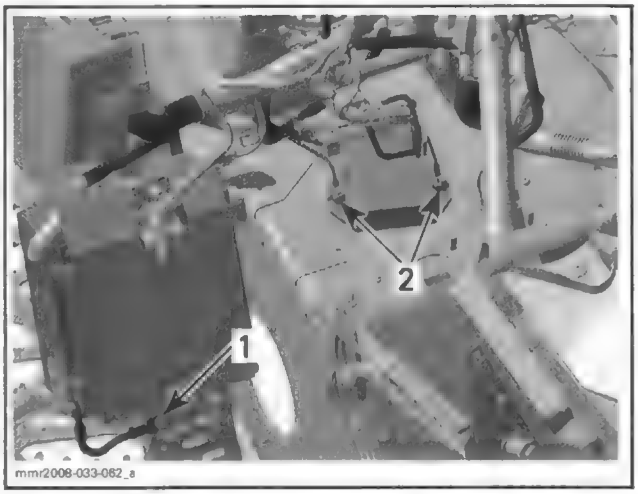
Check continuity of wiring as follows.

ECM CONNECTOR PIN	BATTERY	MEASUREMENT
B-1	Battery ground	Close to 0 Ω (continuity)
B-2		
B-9		
B-32		
B-34		
B-41		



If test succeeded, ECM grounds are adequate.

If test failed, check ECM ground to frame at voltage regulator/rectifier and battery ground.



1. *Battery ground*
2. *ECM ground (main harness)*

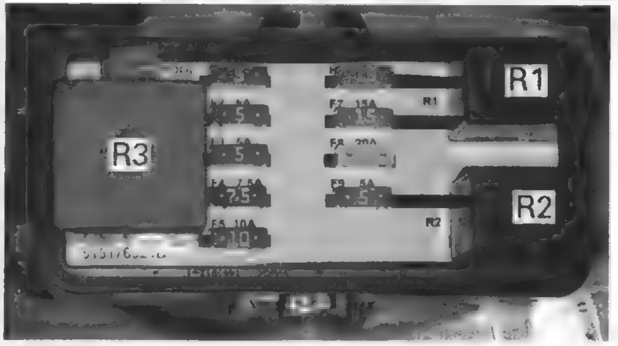
Relay 2 Test

NOTE: Relays 1 and 2 work together. They are wired in palallel.

When relay 2 is not working, the following components will not be powered:

- Fuel injectors
- Ignition system
- ECM
- e-RAVE solenoid
- Multifunction gauge
- Fuel pump
- Starter solenoid control
- Relay 3 control and therefore lights and accessories.

Remove relay 2 from fuse box.

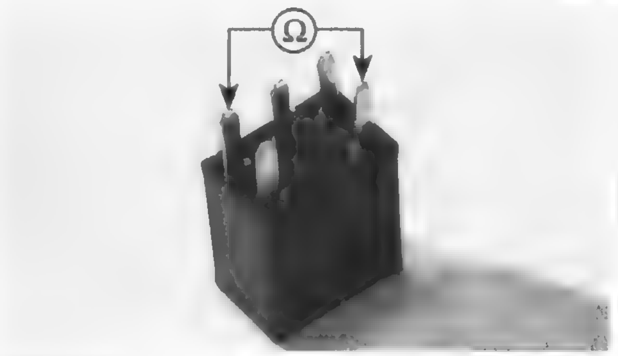


mmr2008-033-056_a

Use the Fluke 111 multimeter (P/N 529 035 868), and select the Ω position.

Probe relay as follows.

TERMINAL		RESISTANCE
30	87	Open circuit (0L)



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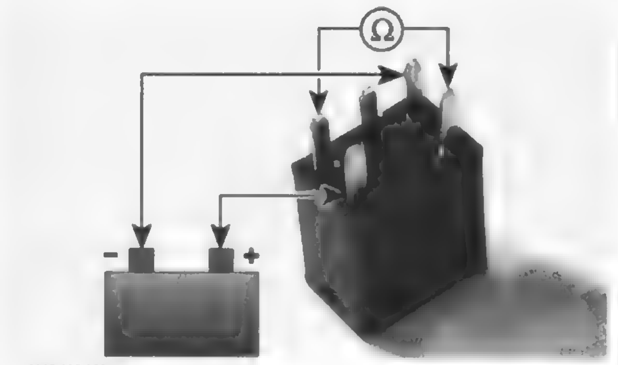
Connect battery as shown and probe relay again as follows.

TERMINAL		RESISTANCE
30	87	0.5 Ω max. (continuity)



smr2007-027-060_a

If relay failed any test, replace it.

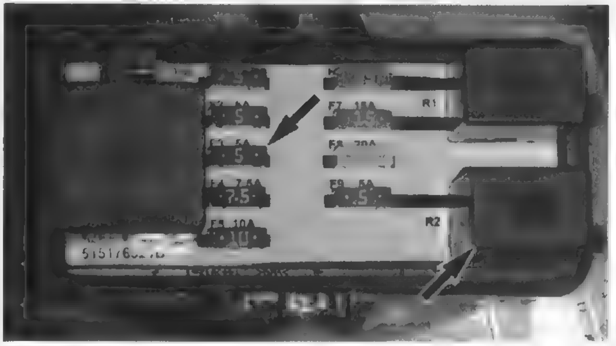
Diode D1 Test

An open circuit failure of the diode will prevent the ECM to be powered. To quickly troubleshoot an open circuit failure, do the following:

- Press START/RER button. Multifunction gauge will turn on.
- If gauge turn off as soon as START/RER button is released, diode is likely to be defective.

A short circuit failure of the diode may increase fuel consumption and might cause the capacitor failure. Also, engine may run rougher at idle and midrange RPM.

Remove relay 2, fuses F3 and F4.



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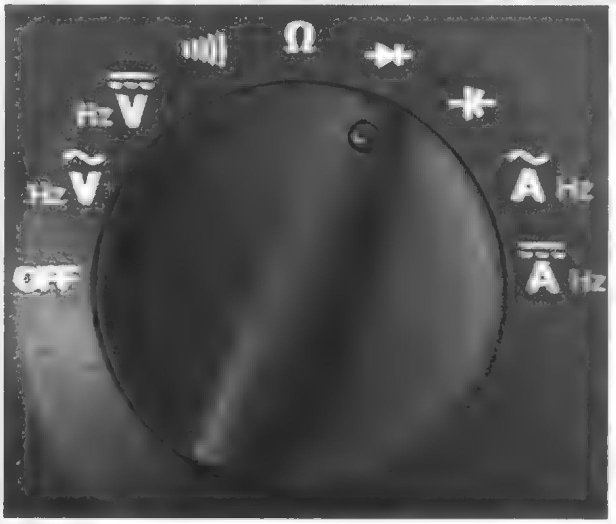
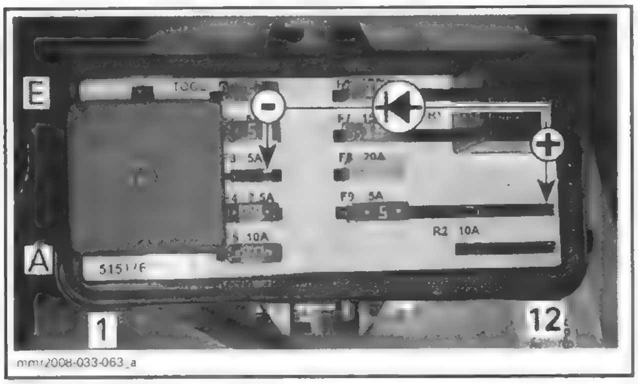
Set multimeter as shown.

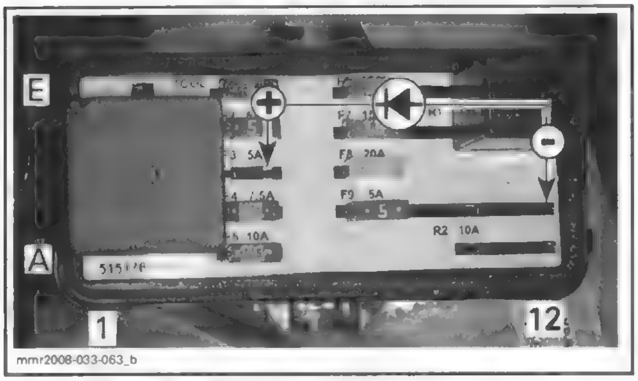


vmr2006-020-005

Probe fuse box terminals paying attention to proper polarity.


E
A
1
12
3 5A
4 7.5A
5 10A
F8 20A
F9 5A
R2 10A
mmr2008-033-063_a

MUST BE AROUND 0.5 V


E
A
1
12
3 5A
4 7.5A
5 10A
F8 20A
F9 5A
R2 10A
mmr2008-033-063_b

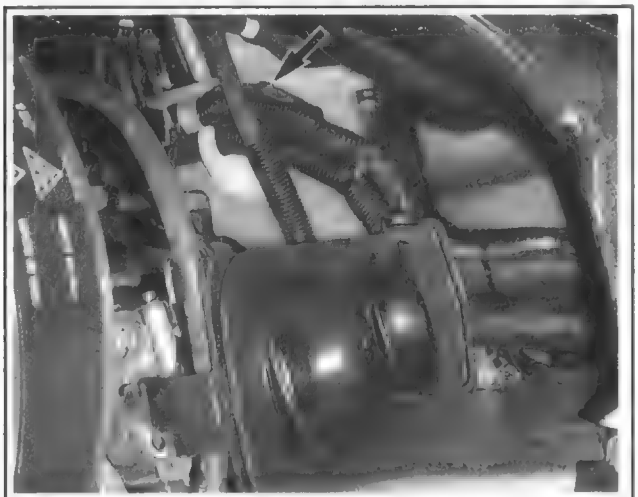
MUST BE OPEN CIRCUIT

If diode fail any test, replace it.

Diode is located on main harness between injection oil reservoir and throttle body.

Remove pulley guard. Refer to *DRIVE SYSTEM/ BRAKE.*

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM.*


mmr2008-033-064_a

DIODE LOCATION

Reinstall removed parts.

ECM Replacement

Prior to replacing a possibly faulty ECM, ensure that all the tests have been carried out. Also, check ECM power supply and all grounds for proper contact/cleanliness and tightness.

To allow transferring the previous recorded information (if the defective ECM can be read) to the new ECM, use the B.U.D.S. software. Use **Replace ECM** in the **ECM** menu. Follow instructions provided by the help system.

ECM Removal

Disconnect battery cables.

⚠ WARNING

Battery BLACK (-) cable must always be disconnected first and connected last.

Remove muffler. Refer to *EXHAUST SYSTEM.*

Remove the acoustic panel.

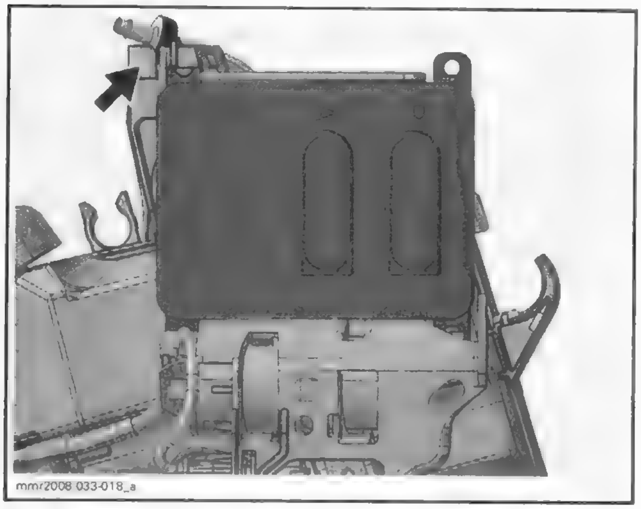
mmr2008-024-008_a

Disconnect ECM connectors.

Cut locking ties as necessary.

Remove ECM as follows.

1. Push the LH upper tab and hold.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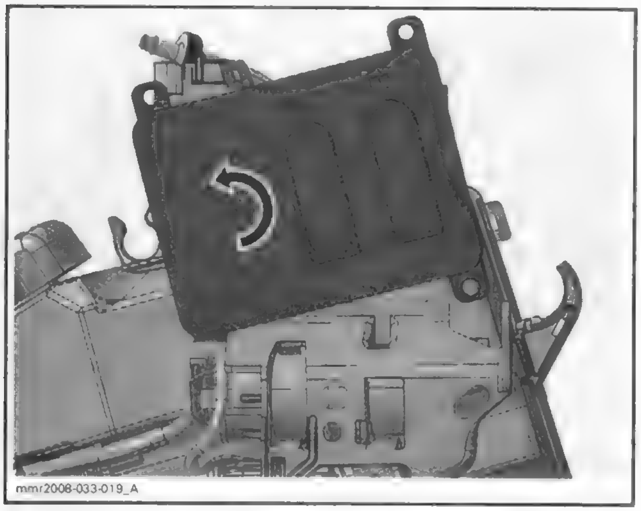
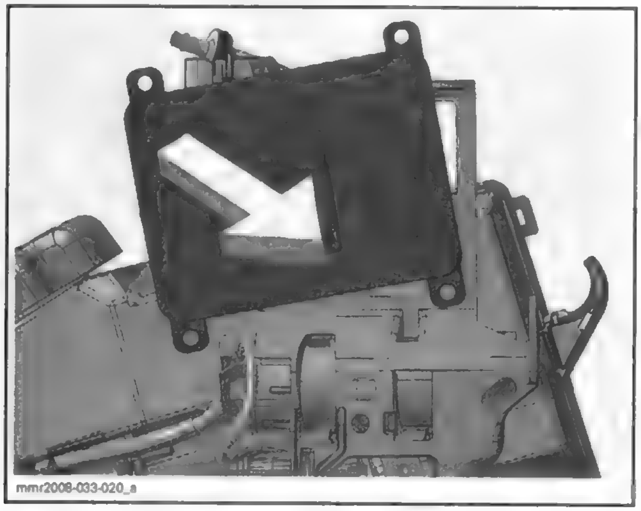
2. Rotate ECM counterclockwise.


mmr2008-033-019_A

3. Pull out ECM.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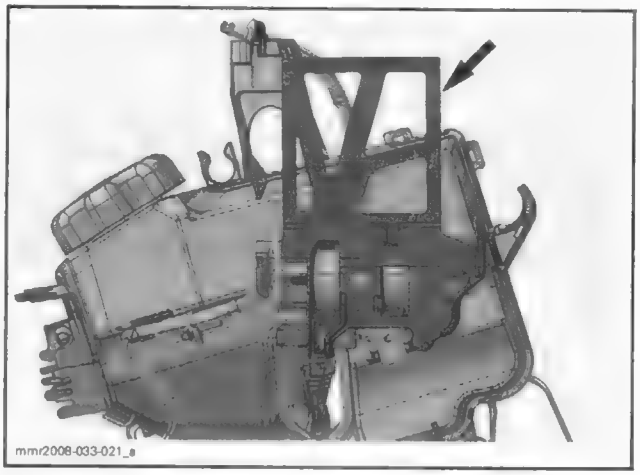
ECM Installation

Install ECM as follows.

1. Install capacitor retaining bracket.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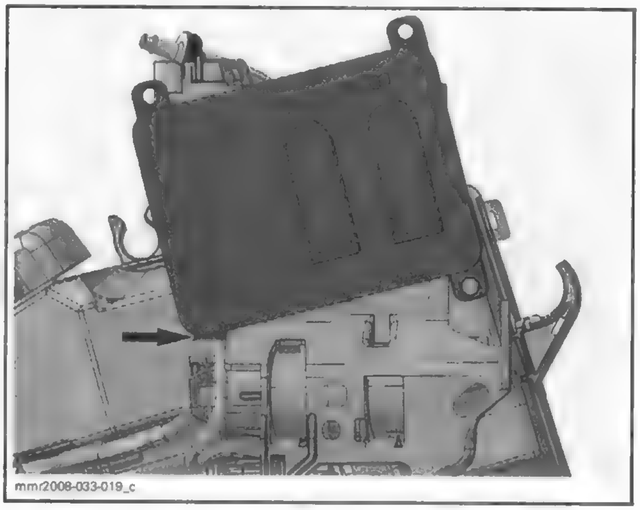
2. Insert the LH bottom tab of ECM first.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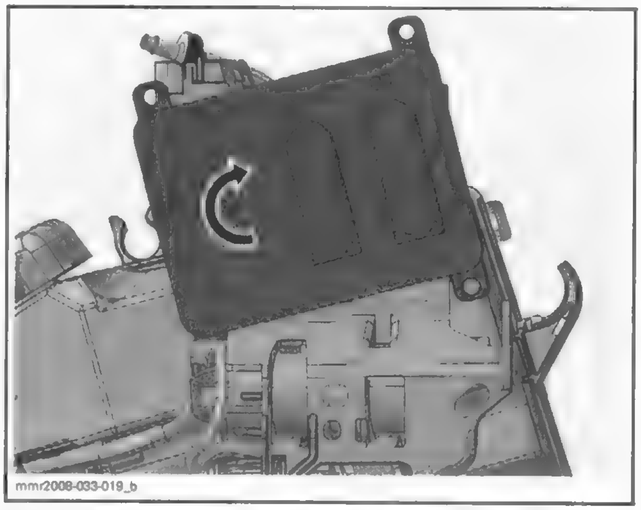
3. Rotate ECM clockwise until the other tabs are engaged and ECM locks in position.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Reconnect ECM connectors to ECM, and then battery cables.

Transfer the data from the previous ECM to the new one using B.U.D.S.

If you are unable to transfer the data, proceed as follows.

Use B.U.D.S. software:

- Enter the proper information in **Vehicle** tab.

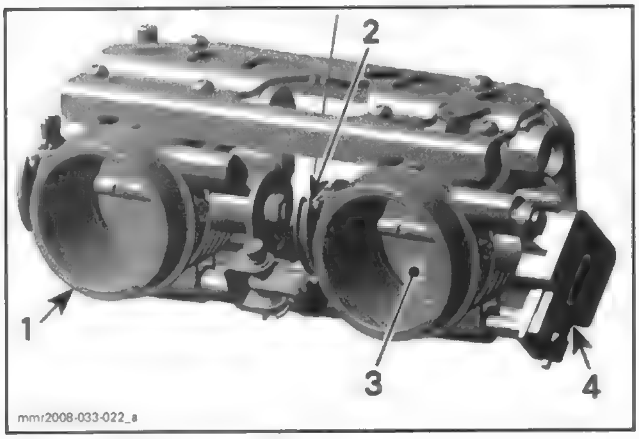
CAUTION: Pay particular attention when typing the VIN and model numbers. Once Write Data button is pressed, numbers cannot be modified.

- Reprogram DESS key. Refer to *DESS SYSTEM.*
- Perform the closed throttle reset. Refer to *CLOSED THROTTLE RESET* above.
- Set the multifunction gauge units. Refer to *LIGHTS/GAUGE/ACCESSORIES.*

Start the engine and increase engine speed above 6000 RPM to be sure no fault appears.

Reinstall removed parts.

THROTTLE BODY



1. *Throttle body*
2. *Throttle cable attachment*
3. *Throttle plate*
4. *TPS*

Throttle Body Inspection

Check that the throttle plate moves freely and smoothly when depressing throttle lever.

IMPORTANT: Do not alter the setting of the zero position screws or synchronization screw, otherwise throttle body must be replaced.

Before replacing any part, check the following as these could be causing the fault. Perform the test while the engine is not running.

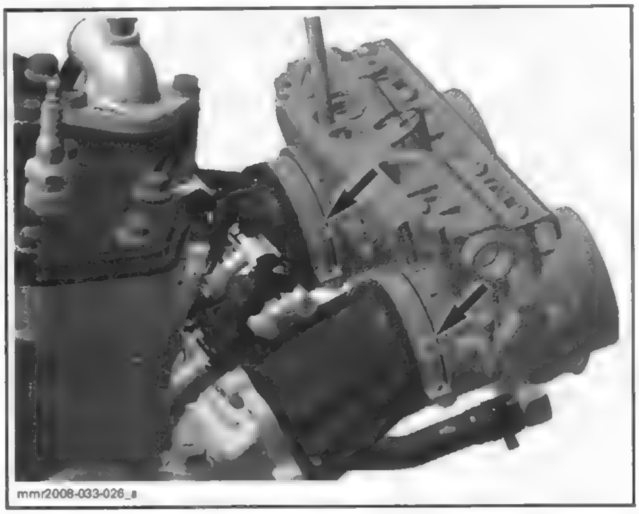
- Throttle cable adjustment too tight. Not returning fully to idle stop.
- Throttle body idle set screw is loose or worn.
- TPS is loose.
- Corroded or damaged wiring or connectors.
- Throttle body or ECM has been replaced and the **Closed Throttle** reset has not been performed.

Throttle Body Replacement

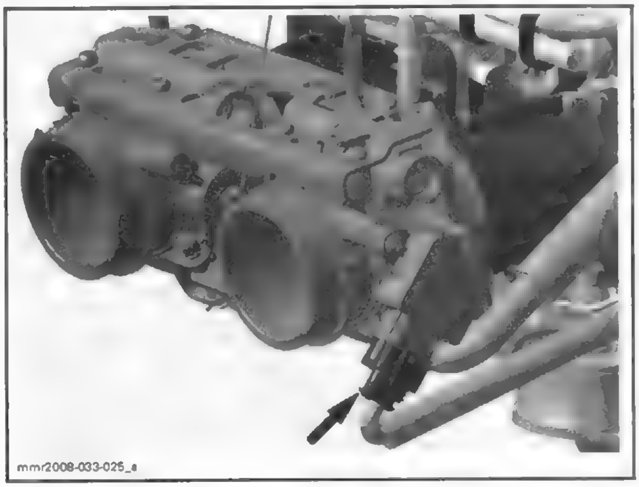
Throttle Body Removal

To remove the throttle body from engine, proceed as follows:

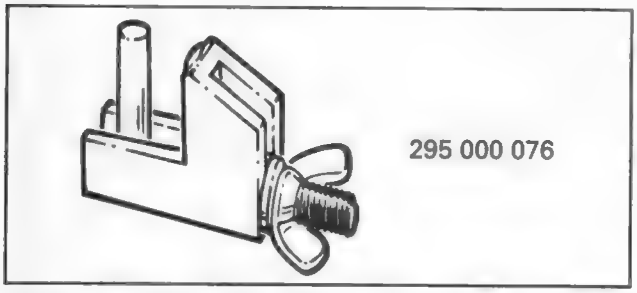
- Use B.U.D.S. and release the fuel pressure in the system. Look in the **Activation** section.
- Remove pulley guard. Refer to *DRIVE SYSTEM/BRAKE.*
- Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM.*
- Slacken retaining clamps of throttle body.

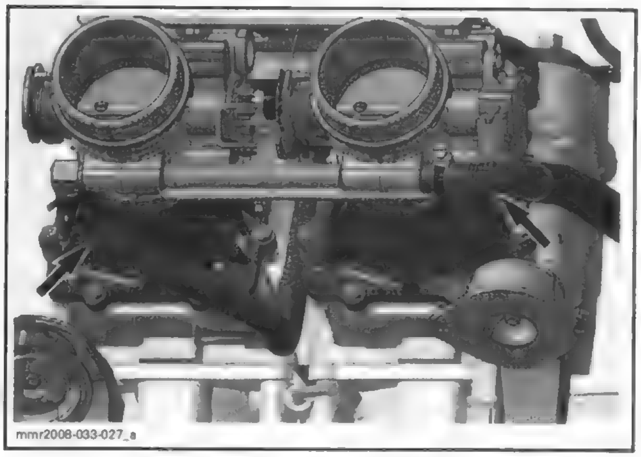


- Pull throttle body enough to reach coolant hoses and TPS connector.
- Disconnect TPS connector.



- Install hose pinchers (P/N 295 000 076) on coolant hoses connected to throttle body.





- Detach coolant hoses for throttle body.
- Disconnect throttle cable.
- Pull throttle body out.

Throttle Body Installation

Installation of the new throttle body is the reverse of the removal procedure. Pay attention to the following details.

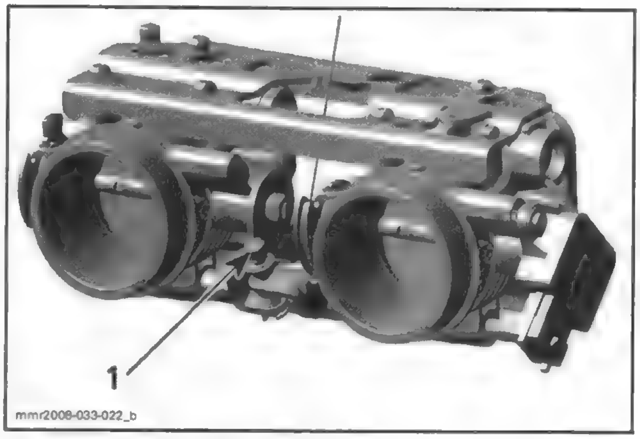
Before installation, clean throttle plates and bores with pulley flange cleaner (P/N 413 711 809).

Refill engine coolant. If an important quantity of coolant was spilled, bleed cooling system. Refer to *COOLING SYSTEM* section.

Throttle Body Synchronization

No synchronization is required as it has already been done at the factory.

CAUTION: Do not alter setting synchronization screw. Otherwise throttle body must be replaced.



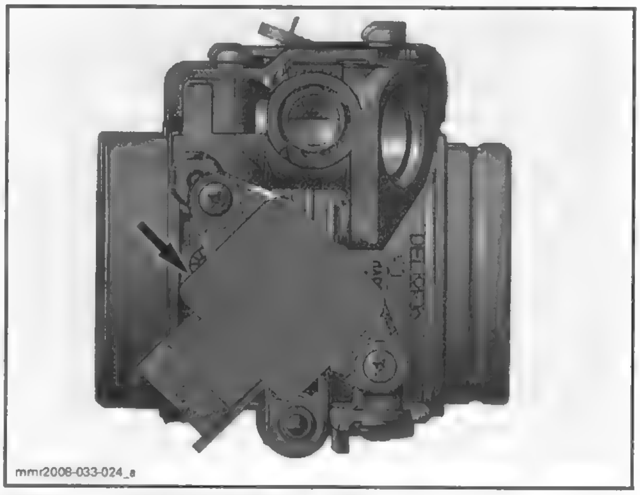
TYPICAL THROTTLE BODY
1. Synchronization screw

THROTTLE POSITION SENSOR (TPS)

General

NOTE: Before replacing a TPS, ensure there is not too much pull on the wires and they are not chaffed or cuts.

The throttle position sensor (TPS) is a potentiometer that sends a signal to the ECM which is proportional to the throttle shaft angle.



THROTTLE POSITION SENSOR (TPS)

IMPORTANT: Prior to testing the TPS, ensure that mechanical components/adjustments are adequate according to *THROTTLE BODY* in this section.

The ECM may generate several fault codes pertaining to the TPS. Refer to *MONITORING SYSTEM/FAULT CODES* section for more information.

TPS Wear Test

While engine is not running, activate throttle and pay attention for smooth operation without physical stops of the cable.

Use B.U.D.S. software.

Use the **Throttle Opening** display under **Monitoring**.

Slowly and regularly depress the throttle. Observe the needle movement. It must change gradually and regularly as you move the throttle. If the needle "sticks", bounces, suddenly drops or if any discrepancy between the throttle movement and the needle movement is noticed, it indicates a worn TPS that needs to be replaced.

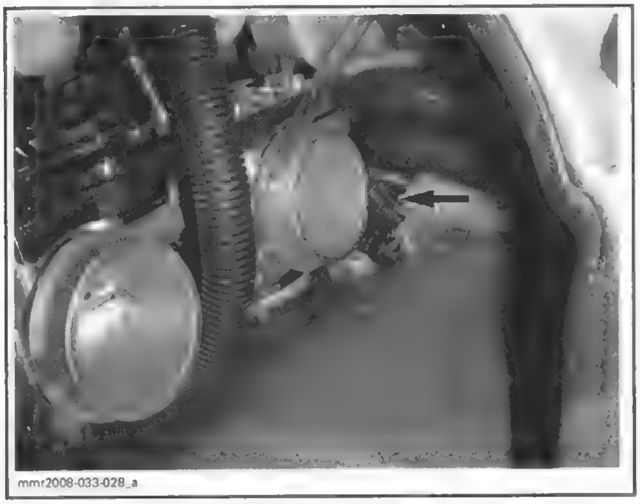
TPS Input Voltage Test

Check the voltage output from ECM to the throttle position sensor.

Remove pulley guard. Refer to *DRIVE SYSTEM/BRAKE.*

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM.*

Disconnect TPS connector.



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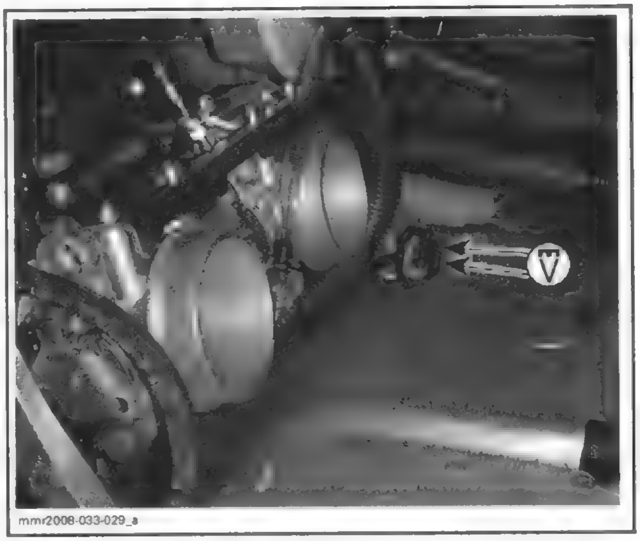
NOTE: To unlock connector, insert a small screwdriver between the folded tab. To see the connector pin-out and its pin numbers, temporarily remove the connector shield joining the harness.

Install the tether cord cap, turn OFF engine cut-out switch and push START/RER button momentarily to activate the ECM.

Read voltage at TPS harness connector as follows.

TPS HARNESS CONNECTOR		VOLTAGE
Pin 1	Pin 2	5.0 Vdc



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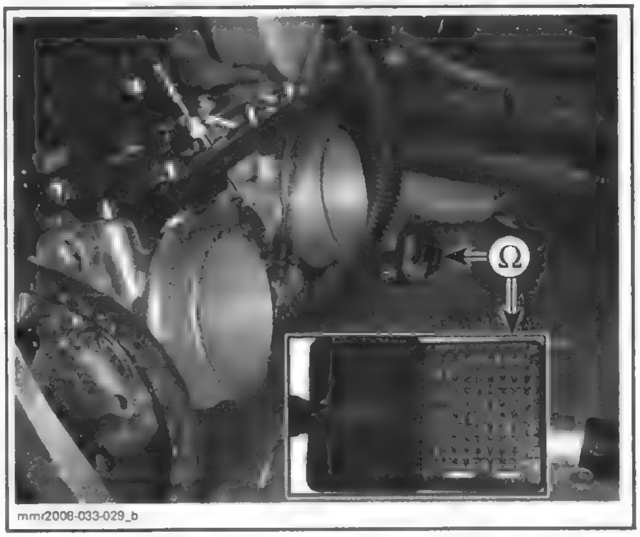
If voltage is good, check the TPS signal wire.

TPS Signal Wire Test

Disconnect "A" connector from ECM.

Check the wiring continuity as follows

TPS HARNESS CONNECTOR	ECM "A" CONNECTOR	RESISTANCE
Pin 3	Pin 24	Close to 0 Ω (continuity)



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If tests are good, replace the TPS.

If tests are not good, continue to check the resistance of the rest of the TPS circuit.

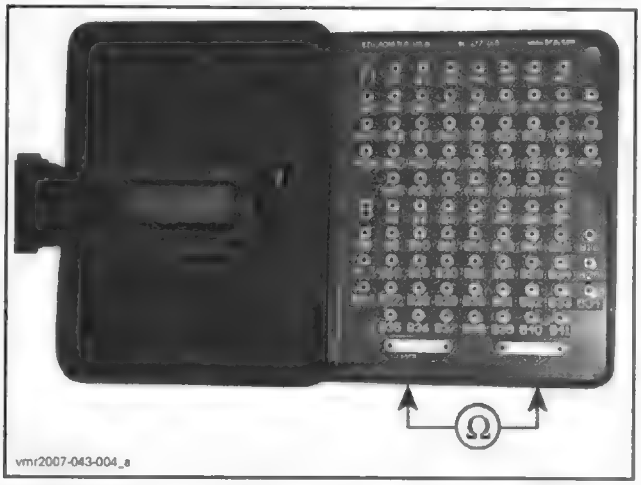
TPS Resistance Test

Reconnect the TPS.

Disconnect the connector "A" from the ECM.

Using a multimeter, check resistive value as per the following table.

ECM CONNECTOR		THROTTLE IDLE POSITION	WIDE OPEN THROTTLE POSITION
PIN	PIN	RESISTANCE Ω	
A-24	A-25	2500	1000
A-25	A-39	1600 - 2400	1600 - 2400
A-24	A-39	1000	2500



NOTE: The resistive value should change smoothly and proportionally to the throttle movement. Otherwise, replace TPS.

If resistive values are correct, try a new ECM. Refer to *ENGINE CONTROL MODULE (ECM)* elsewhere in this section.

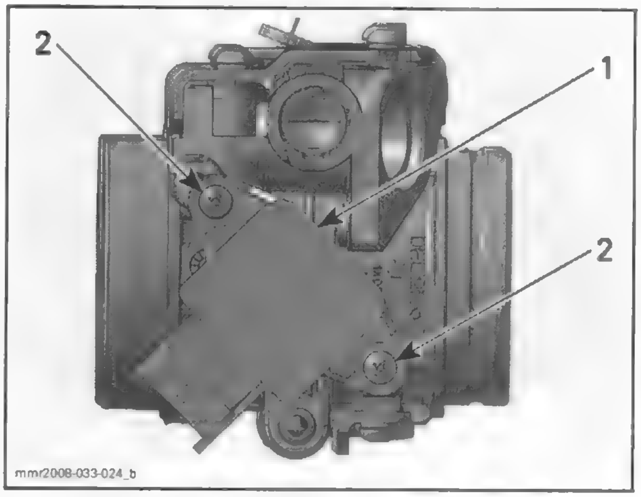
If resistive values are incorrect, repair/replace wiring/connectors. If they are good, replace TPS.

TPS Replacement

Remove the throttle body as described above.

Loosen two screws retaining the TPS.

Remove TPS.



1. *Throttle position sensor (TPS)*
2. *Screws*

Install the new TPS.

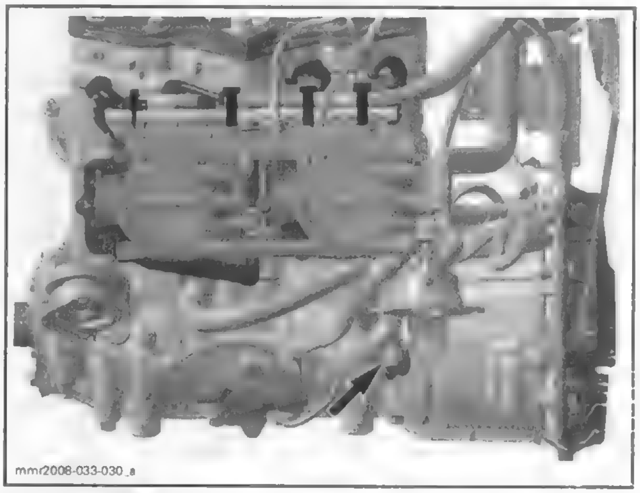
Apply Loctite 243 on the TPS retaining screws, then torque to 3 N•m (27 lbf•in).

Reinstall remaining removed parts.

Proceed with the **Closed Throttle Reset**.

CRANKSHAFT POSITION SENSOR (CPS)

NOTE: The CPS is used for forward and reverse.



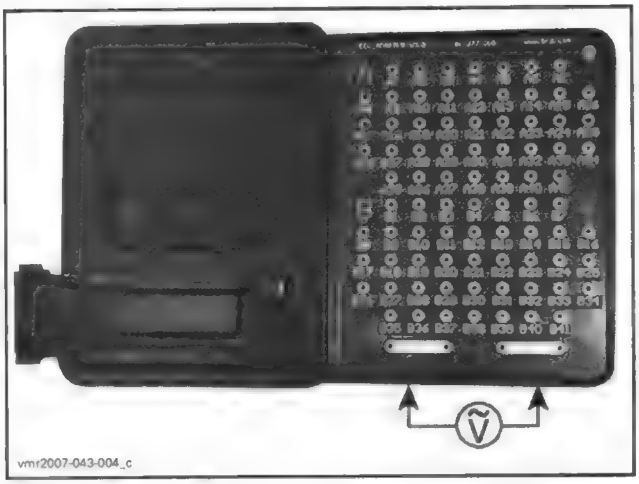
CPS CONNECTOR

CPS Output Voltage Test

Disconnect connector "A" from ECM.

Probe terminals coming from CPS while cranking engine.

ECM "A" CONNECTOR		VOLTAGE
Pin 5	Pin 19	1 - 2 Vac



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If voltage is out of specification, inspect wiring/connectors. Replace CPS if wiring is good.

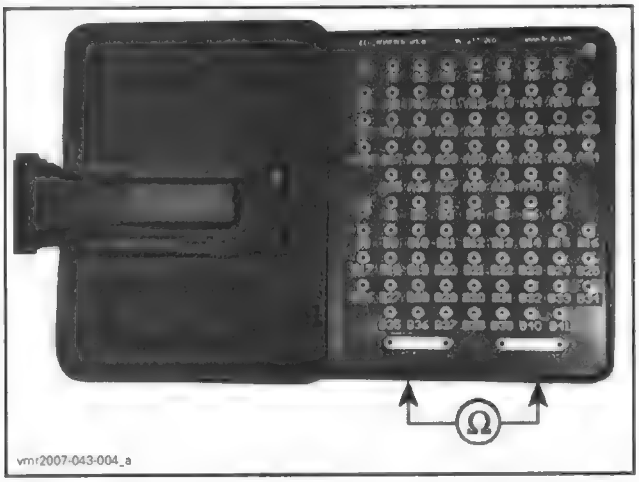
NOTE: To gain access to CPS connector, refer to *CPS REPLACEMENT.*

CPS Resistance Test

Disconnect connector "A" from ECM.

Measure the resistance of the sensor itself.

ECM "A" CONNECTOR		RESISTANCE @ 20°C (68°F)
Pin 5	Pin 19	190 - 300 Ω



vmr2007-043-004_a

If measurement is out of specification, check wiring continuity between ECM and CPS. If continuity is good, replace CPS.

Also check for a bad ground connection as follows.

ECM "A" CONNECTOR		RESISTANCE @ 20°C (68°F)
Pin 5	Engine ground	Open circuit (0L)
Pin 19	Engine ground	

If measurement is out of specification, check wiring between ECM and CPS.

CPS Replacement

To Disconnect CPS Connector:

Use B.U.D.S. and release fuel pressure. Look in the **Activation** section.

Remove pulley guard. Refer to *DRIVE SYSTEM/ BRAKE.*

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM.*

Remove driven pulley. Refer to *DRIVE SYSTEM/ BRAKE.*

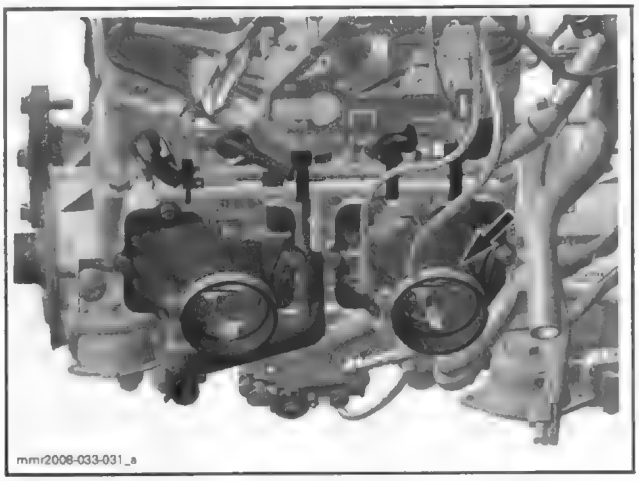
Detach throttle body from engine.

Disconnect TPS connector.

Raise throttle body and secure with a locking tie to keep it away.

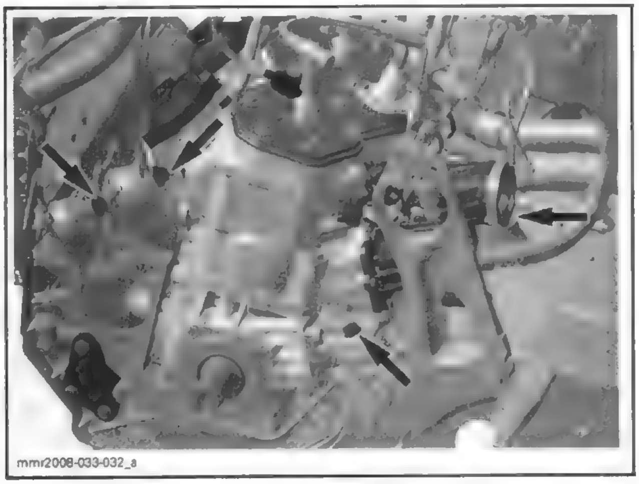
Disconnect fuel supply hose.

Remove MAG intake adapter.



mmr2008-033-031_a

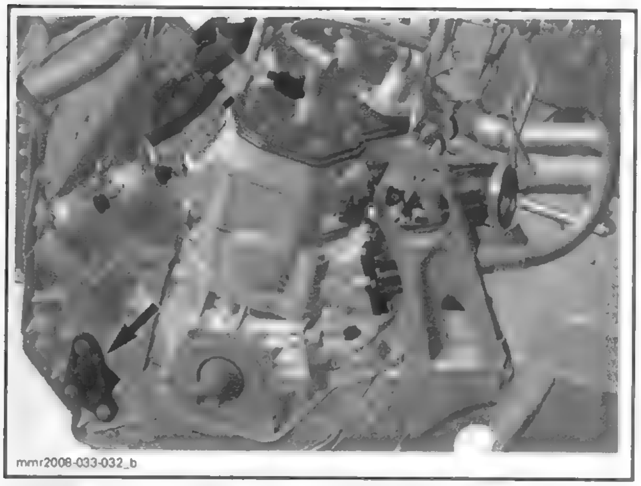
Remove engine mount screws.



mmr2008-033-032_a

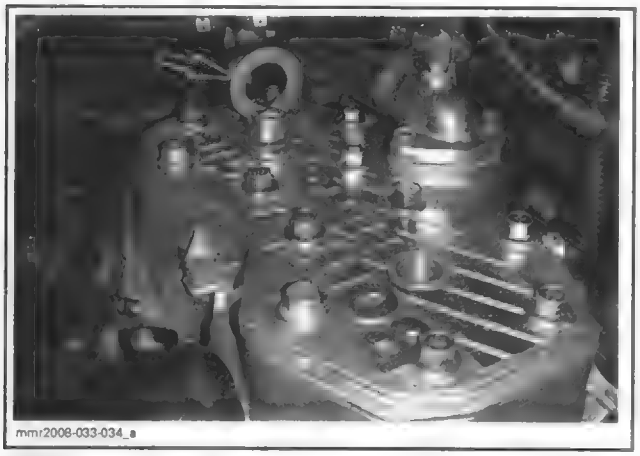
SOME PARTS REMOVED FOR CLARITY PURPOSE ONLY

Remove engine torque support.


mmr2008-033-032_b

SOME PARTS REMOVED FOR CLARITY PURPOSE ONLY

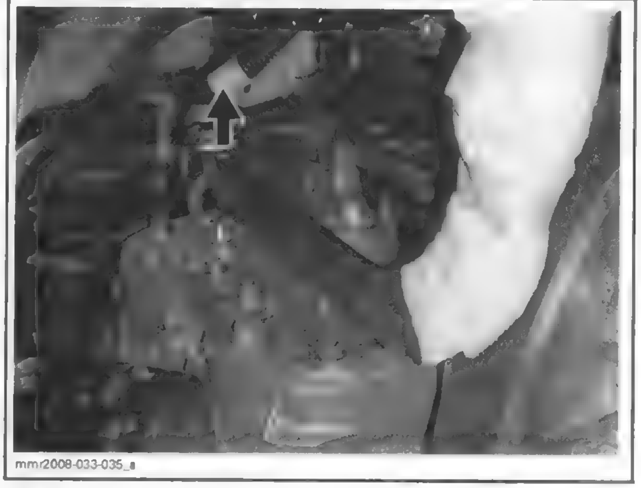
Remove spark plugs and install spark plug lift ring (P/N 529 035 830) in MAG side hole.


mmr2008-033-034_a

TYPICAL

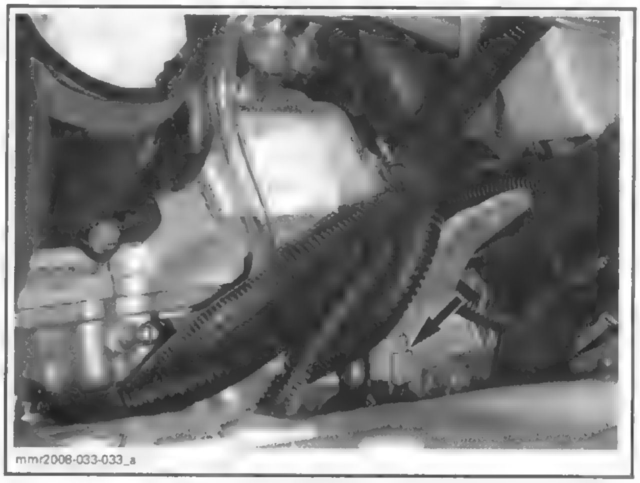
Install the engine removal hook (P/N 529 035 829) on spark plug lift ring.

Lift engine as much as you can.


mmr2008-033-035_a

TYPICAL

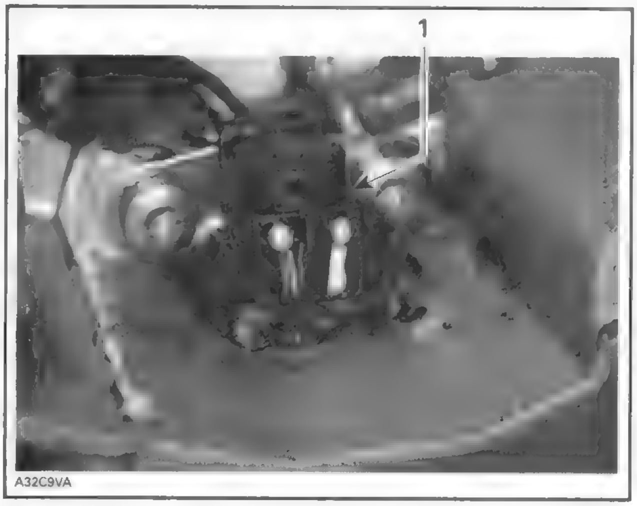
Disconnect CPS connector.


mmr2008-033-033_a

To Replace CPS:

Remove magneto flywheel. Refer to *MAGNETO SYSTEM*.

Remove CPS.



1. *CPS inside crankcase*

When installing new CPS apply Loctite 5910 (P/N 293 800 081) between CPS and crankcase.

Torque to 8 N•m (71 lbf•**in**).

Reinstall remaining removed parts.

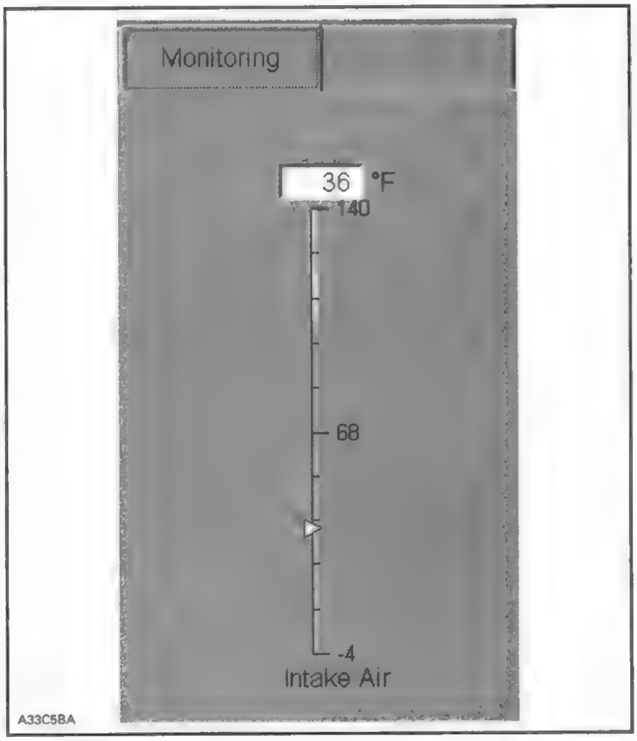
AIR TEMPERATURE SENSOR (ATS)

mmr2008-033-036_a

ATS Test with B.U.D.S.

Use B.U.D.S. software.

Look **Intake Air** in **Monitoring** tab of B.U.D.S. It should show the ambient temperature. Otherwise, perform the following test.

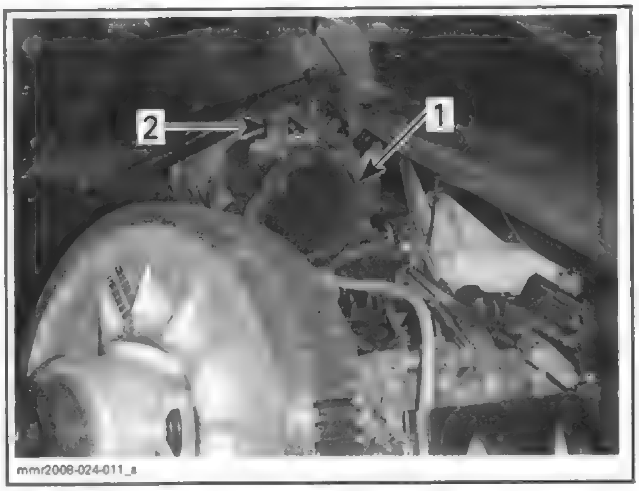


ATS Resistance Test

Remove pulley guard. Refer to *DRIVE SYSTEM/ BRAKE*.

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM*.

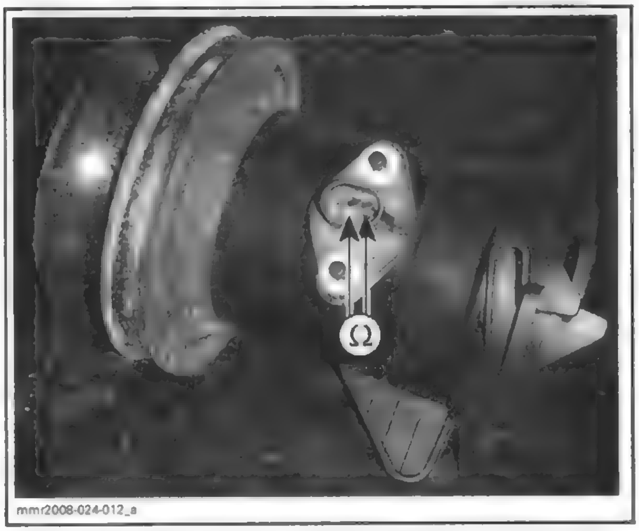
Rotate intake adapter to disconnect ATS sensor connector.



TYPICAL
1. *Rotate intake adapter*
2. *Disconnect sensor connector*

Measure sensor resistance.

ATS		MEASUREMENT
Pin 1	Pin 2	Refer to *TEMPERATURE SENSOR TABLE* above



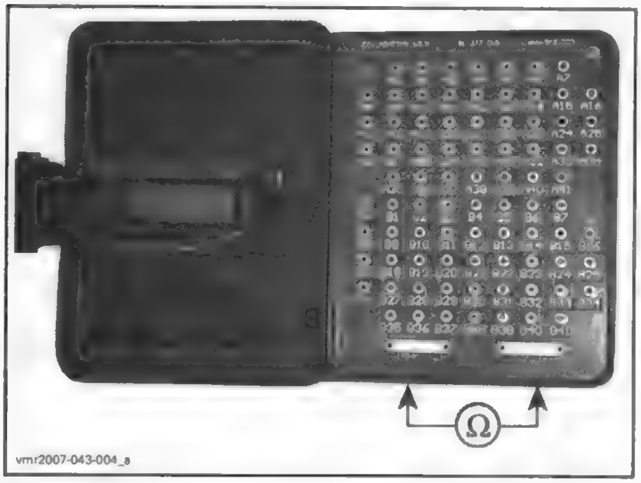
INTAKE ADAPTER REMOVED FOR CLARITY PURPOSE ONLY

If out of specifications, replace sensor.

If resistance tests good, **reconnect** the ATS and disconnect the ECM connector.

Using a multimeter, measure resistance value as follows.

ECM CONNECTOR		MEASUREMENT
Pin A-7	Pin A-21	Refer to *TEMPERATURE SENSOR TABLE* above



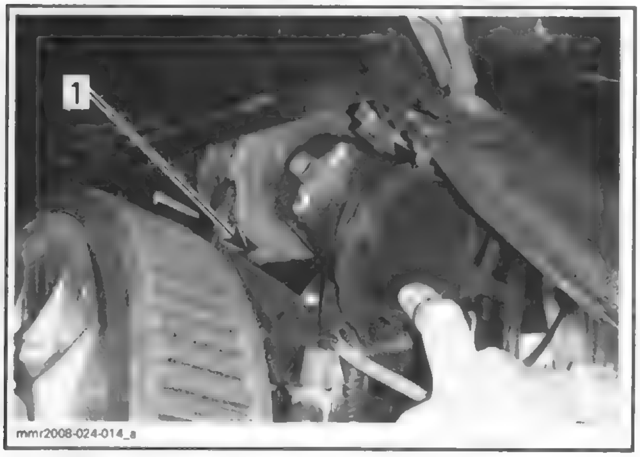
If resistance value is incorrect, repair the connectors or replace the wiring harness between ECM connector and the ATS.

Reinstall removed parts. Ensure intake adapter boot is properly installed on the adapter. See below in *ATS REPLACEMENT.*

ATS Replacement

See procedures above to reach sensor.

Slacken boot clamp.

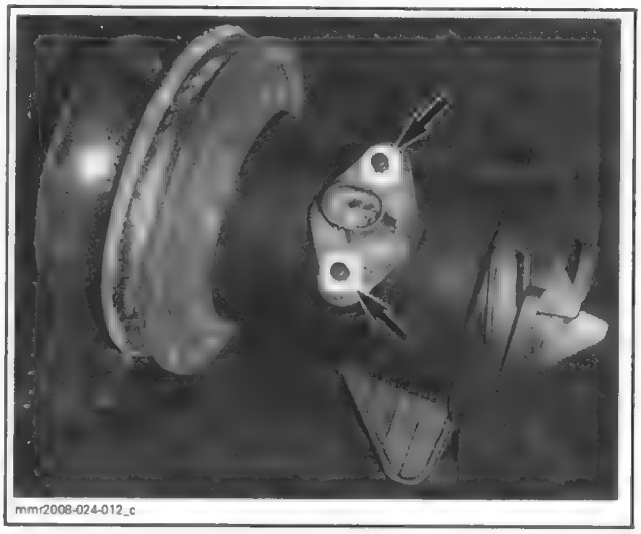


1. Boot clamp

Unplug ATS connector.

Pull out intake adapter.

Remove sensor push nuts.

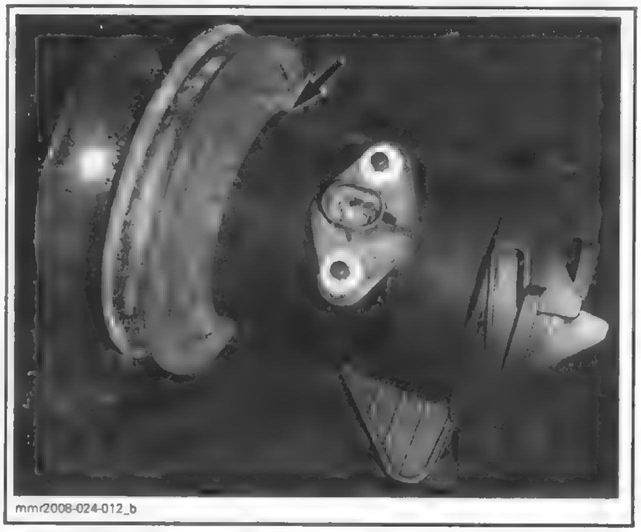


Pull out sensor.

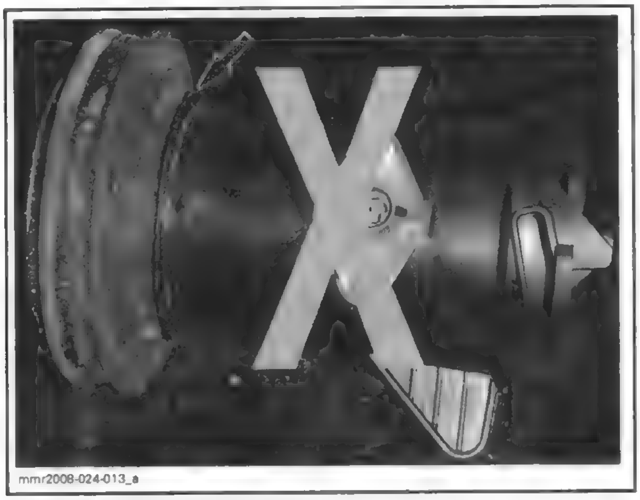
Use new push nuts and secure the new sensor to adapter.

Reconnect ATS.

Ensure adapter boot is properly installed as shown.



CORRECT BOOT INSTALLATION


mmr2008-024-013_a

WRONG BOOT INSTALLATION

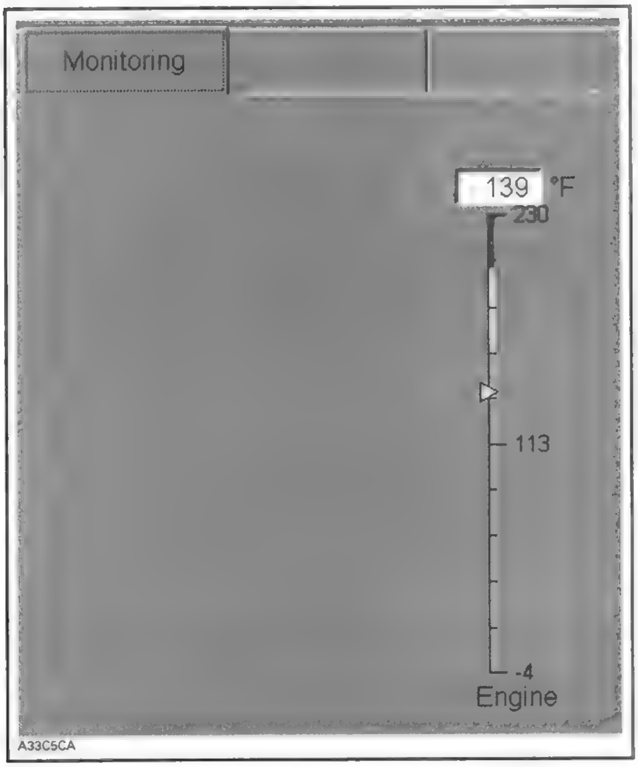
Reinstall removed parts.

COOLANT TEMPERATURE SENSOR (CTS)

CTS Test with B.U.D.S.

Use B.U.D.S. software.

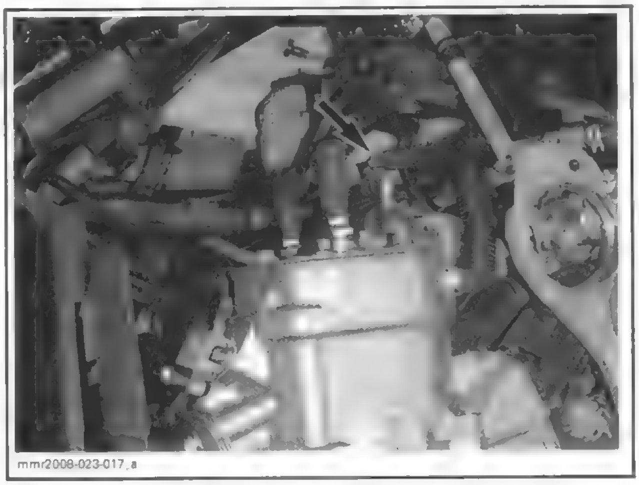
Look engine temperature in **Monitoring** tab of B.U.D.S. It should show the coolant temperature. Otherwise, perform the following test.


Monitoring
139 °F
230
113
-4
Engine
A33C5CA

CTS Resistance Test

Remove pulley guard. Refer to *DRIVE SYSTEM/ BRAKE.*

Disconnect CTS sensor connector.

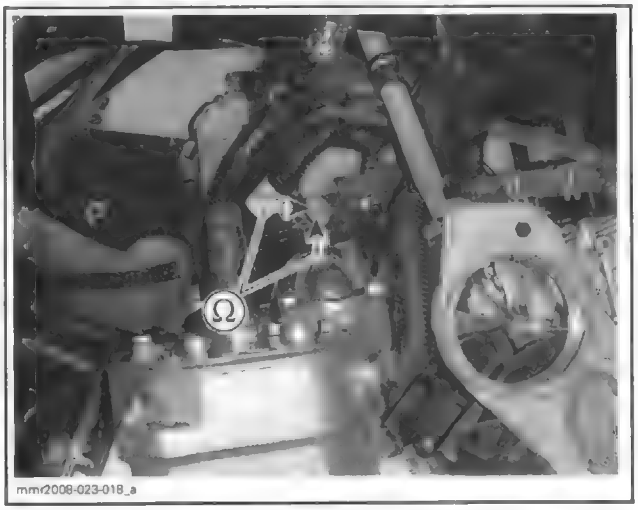

mmr2008-023-017_a

TYPICAL

Use a multimeter and set it to Ω.

Measure resistance between sensor terminals.

CTS		MEASUREMENT
Pin 1	Pin 2	Refer to *TEMPERATURE SENSOR TABLE* above


Ω
mmr2008-023-018_a

TYPICAL

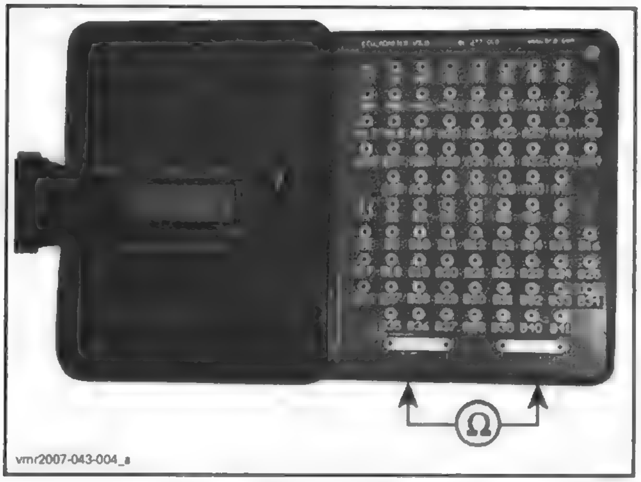
If resistance is out of specifications, replace CTS.

If resistance tests good, **reconnect** the CTS.

Disconnect the "A" connector from ECM.

Measure resistance as follows.

ECM CONNECTOR		MEASUREMENT
Pin 11	Pin 27	Refer to *TEMPERATURE SENSOR TABLE* above



vmr2007-043-004_a

If resistance value is correct, sensor and wiring/connectors are good.

If resistance value is incorrect, repair/replace wiring/connectors between ECM and CTS.

CTS Replacement

Remove pulley guard. Refer to *DRIVE SYSTEM/ BRAKE*.

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM*.

Remove driven pulley. Refer to *DRIVE SYSTEM/ BRAKE*.

Lift rear of vehicle to minimize coolant spillage.

Disconnect CTS connector.

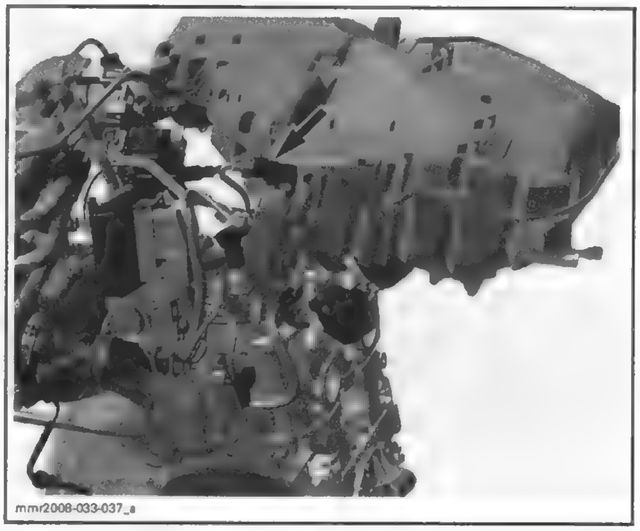
Remove CTS.

Install the new CTS and torque to 12 N•m (106 lbf•**in**).

Reinstall removed parts.

Refill engine coolant. If an important quantity of coolant spilled, bleed cooling system. Refer to *COOLING SYSTEM* section.

AIR PRESSURE SENSOR (APS)



mmr2008-033-037_a

APS Inspection

Refer to *BODY* and remove:

- RH side panel
- Hood.

Ensure sensor is correctly installed on secondary air intake silencer. Otherwise, the APS could generate a fault code.

Remove sensor and check for oil or dirt on its end and if problem persists, check the wiring harness. Perform the following tests.

APS Voltage Test

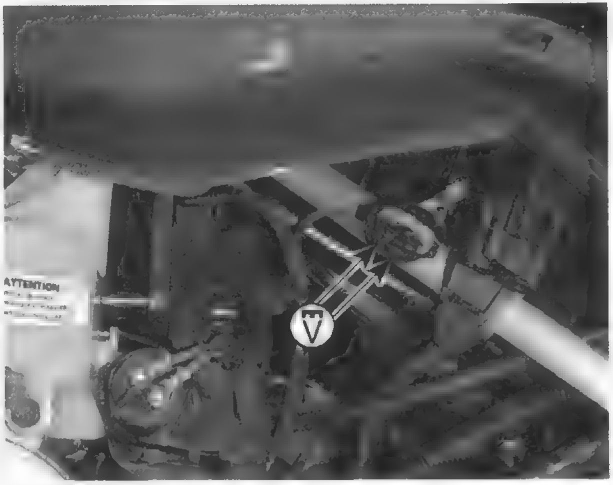
Check the voltage output from ECM to the APS.

Install the tether cord cap, turn OFF engine cut-out switch and push START/RER button momentarily to activate the ECM.

Disconnect connector from APS.

Read voltage as follows.

APS CONNECTOR		VOLTAGE
Pin 1	Pin 3	5 Vdc

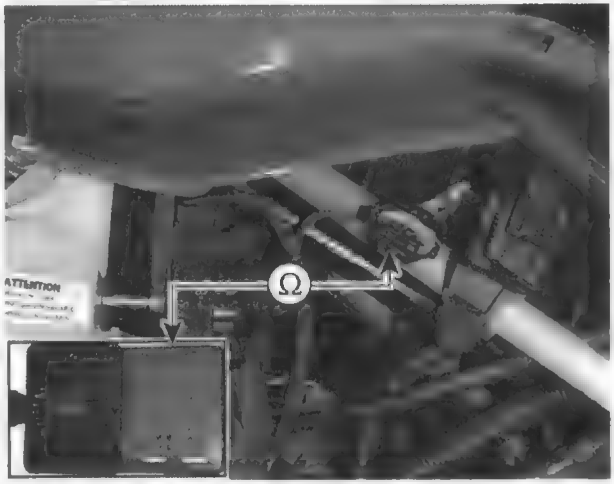


mmr2008-033-038_a

Disconnect "A" connector from ECM.

Check the wiring continuity between ECM and APS as follows.

APS HARNESS CONNECTOR	ECM "A" CONNECTOR	RESISTANCE
Pin 4	Pin 18	Close to 0 Ω (continuity)



mmr2008-033-038_b

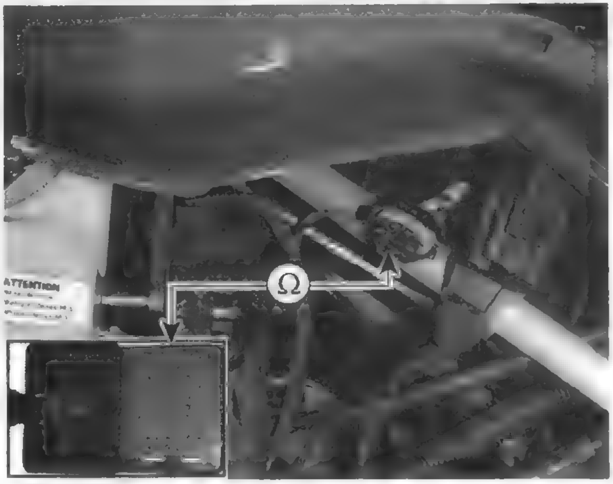
If tests are good, replace the APS.

If tests are not good, continue to check the continuity of the rest of the APS circuit on the harness.

Disconnect the connector "A" from the ECM.

Using a multimeter, check continuity of circuits as per following table.

CIRCUIT NUMBER (ECM CONNECTOR "A")	APS CONNECTOR	RESISTANCE
A-4	Pin 1	Close to 0 Ω (continuity)
A-18	Pin 4	



mmr2008-033-038_b

If wiring harness is good, try a new ECM. Refer to *ENGINE CONTROL MODULE (ECM)* elsewhere in this section.

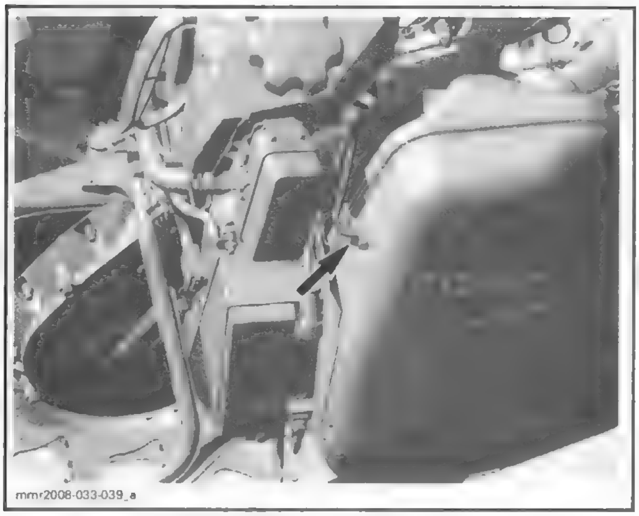
If resistance is bad, repair the connectors or replace the wiring harness between ECM connector and the APS.

APS Replacement

Disconnect APS connector and remove the APS. The APS is retained with a screw.

Install the new APS.

EXHAUST GAS TEMPERATURE SENSOR (EGTS)



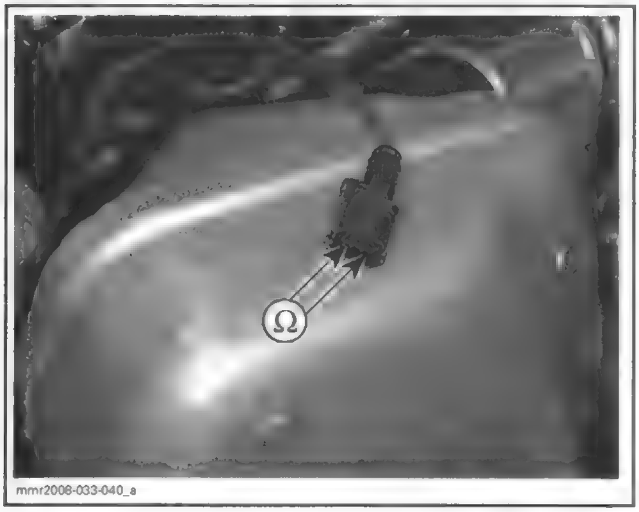
mmr2008-033-039_a

EGTS Resistance Test

Disconnect EGTS connector.

Measure sensor resistance.

EGTS		MEASUREMENT
Pin 1	Pin 2	Refer to *TEMPERATURE SENSOR TABLE* above



mmr2008-033-040_a

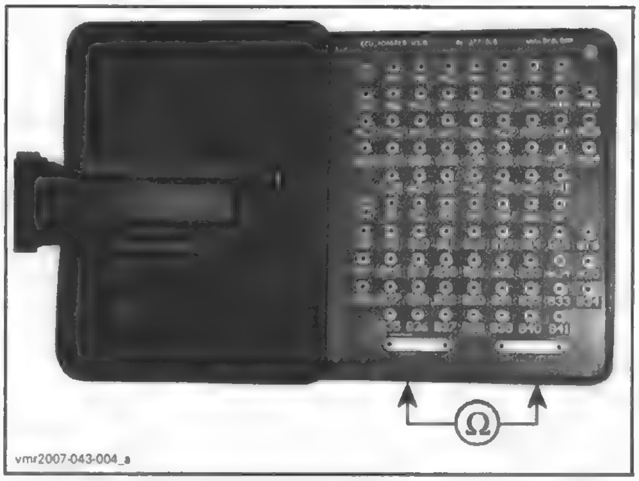
If resistance is out of specification, replace the sensor.

If resistance is as per specification, **reconnect** the EGTS.

Disconnect the "A" connector from ECM.

Measure resistance as follows.

ECM CONNECTOR		MEASUREMENT
Pin 10	Pin 26	Refer to *TEMPERATURE SENSOR TABLE* above



vmr2007-043-004_a

If resistive value is correct, try a new ECM. Refer to *ENGINE CONTROL MODULE (ECM)* elsewhere in this section.

If resistive value is incorrect, repair the connector or replace the wiring harness between ECM connector and the EGTS.

EGTS Removal

Disconnect EGTS connector.

Remove muffler. Refer to *EXHAUST SYSTEM.*

Remove EGTS.

EGTS Installation

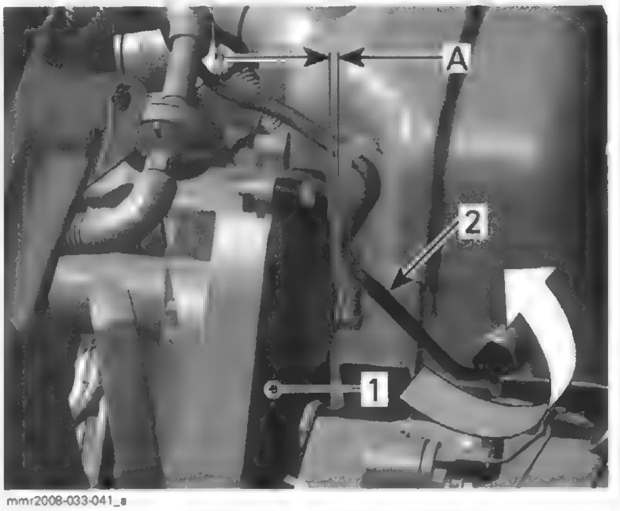
NOTE: New sensors have paraffin wax on their tip to protect the sensor for shipping. Paraffin will melt at first engine operation.

CAUTION: Do not drop or use a sensor that has been dropped. Do not use an impact wrench to install sensor.

Apply anti-seize lubricant (P/N 293 800 070) over the EGTS threads to prevent possible seizure.

Install sensor and turn it so that it goes as close to chaincase as possible without touching it.

CAUTION: Sensor wires must not contact chaincase.



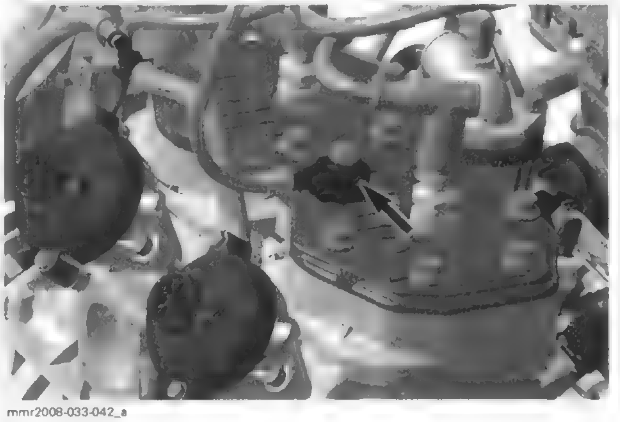
1. Chaincase
2. EGTS
A. The closest to chaincase without touching

NOTE: The sensor needs to be oriented in this specific position for optimum efficiency.

Torque the EGTS to 45 N•m (33 lbf•ft) while preventing sensor to turn.

Install remaining components.

KNOCK SENSOR (KS)

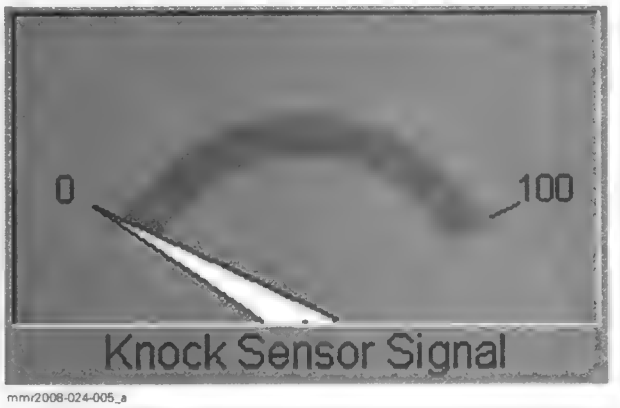


KS Test with B.U.D.S.

Lift rear of vehicle off the ground and support it with a wide-base mechanical stand.

Use B.U.D.S. software.

Monitor the knock sensor using the **Knock Sensor Signal** in **Monitoring** section in B.U.D.S.



MONITORING TAB

Start the engine.

Bring engine speed above 5200 RPM and vary engine RPM above 5200 RPM.

Needle of knock sensor signal should move between 0 and 100. The needle movement pattern is of no importance as long as it moves indicating the engine vibrations the knock sensor senses. If needle "sticks" either to 0 or 100, there is a problem.

If needle moves as described, the knock sensor should be good.

NOTE: Ensure ignition coil cables are not close to knock sensor harness. This might generate a false fault code.

Verify knock sensor circuit as follows.

KS Circuit Continuity Test

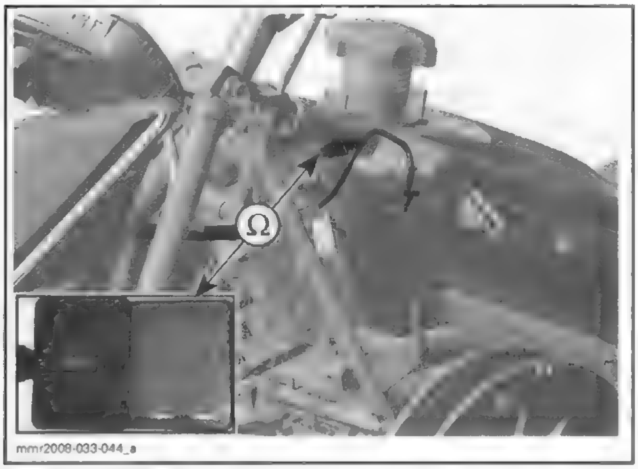
Ensure sensor and head contact surfaces are clean and mounting bolt and washer are correct and properly torqued down.

Disconnect knock sensor connector. Refer to *KNOCK SENSOR REPLACEMENT.*

Disconnect ECM connector.

Check wire continuity of circuit as per following table.

ECM CONNECTOR	KS CONNECTOR	MEASUREMENT
A-22	Pin 1	Close to 0 Ω (continuity)
A-8	Pin 2	



ECM CONNECTOR

If test is not good, repair/replace wiring/ connectors between ECM and knock sensor.

If test is good, try a new knock sensor.

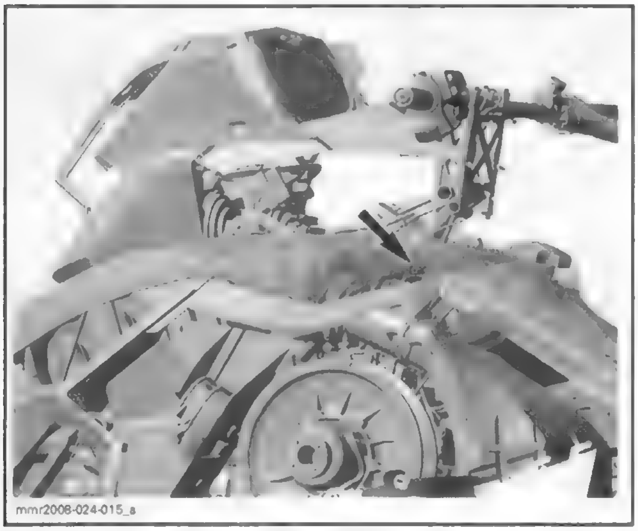
KS Replacement

Unscrew and remove knock sensor from cylinder head.

Remove pulley guard. Refer to *DRIVE SYSTEM/ BRAKE*.

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM*.

Unplug knock sensor connector above ATS.



Clean contact surface, then install the new knock sensor.

Torque screw to 29 N•m (21 lbf•ft).

CAUTION: Improper torque might prevent sensor to work properly and lead engine to severe damage of internal components.

Reconnect connector.

Reinstall remaining parts.

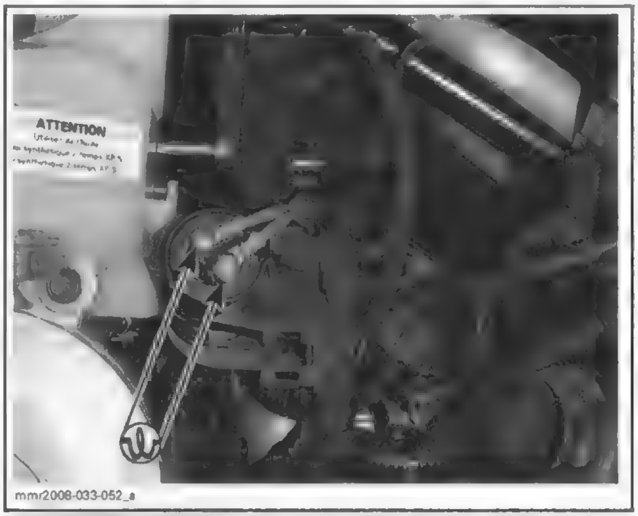
CAPACITOR

Discharging Capacitor Prior to Servicing

⚠ WARNING

Capacitor remains charged some time after tether cord was removed. A high voltage could be suddenly discharged if capacitor terminals were shorted. Always discharge capacitor before servicing.

To properly discharge capacitor, carefully connect a 12 V test lamp to capacitor terminals during 1 minute to properly discharge capacitor.



⚠ WARNING

Never short-circuit capacitor terminals to discharge capacitor.

Capacitor Inspection

NOTE: Inspection is easier to do when capacitor is installed on vehicle.

Visual Inspection

Check for pin holes on top of capacitor. If any is present, replace capacitor.

Charge Hold Test

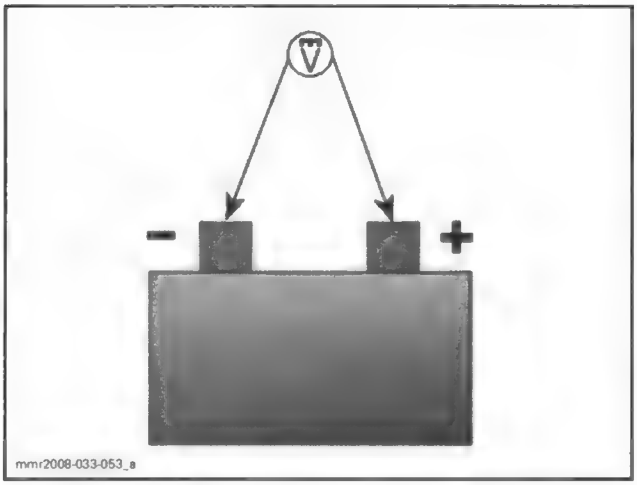
Discharge capacitor.

Press START/RER button to energize capacitor.

On manual start models, crank engine one time.

Use a multimeter and set it to Vdc.

Read battery voltage.

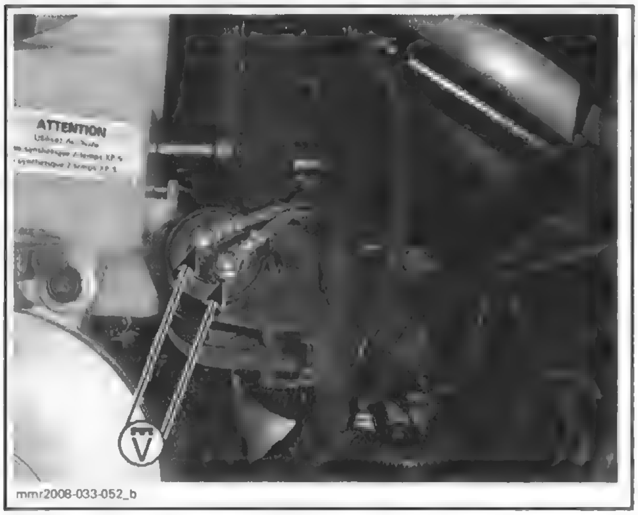


mmr2008-033-053_a

Wait 5 minutes.

Read capacitor voltage. Ensure to use the multimeter RED probe with the + terminal of capacitor.

CAPACITOR VOLTAGE
Must be within 1 Vdc of battery voltage



mmr2008-033-052_b

If measurement is out of specification, check capacitor relay and fuse F8. If it is good, replace capacitor.

If in doubt, proceed with the following residual voltage test.

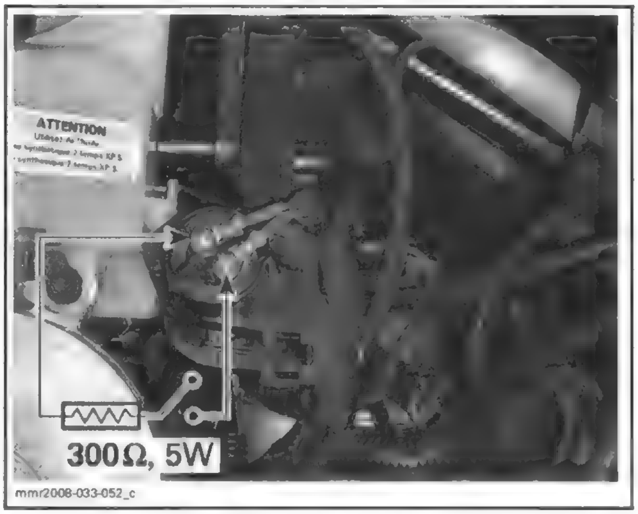
Residual Voltage Test

Discharge capacitor.

Press START/RER button to energize capacitor.

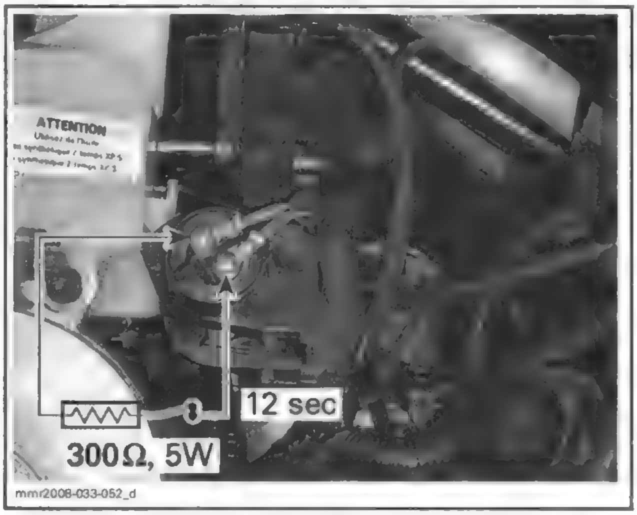
On manual start models, crank engine one time.

Connect a switch (in OFF position) and a 300 Ω 5 W resistor to the capacitor.



mmr2008-033-052_c

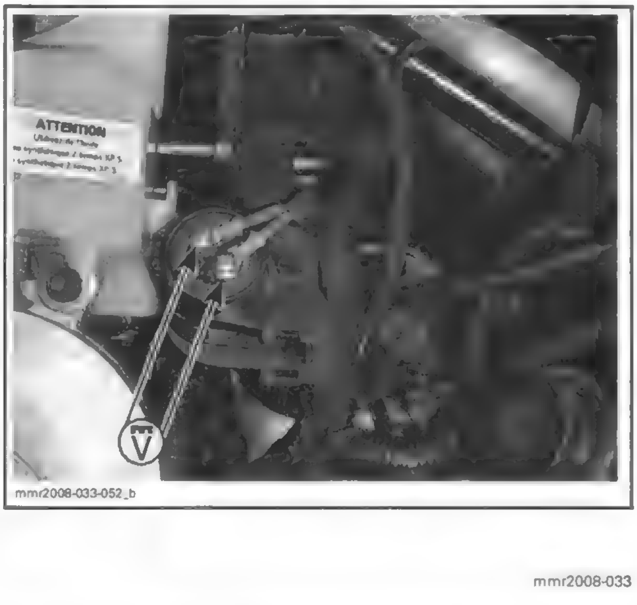
Turn on the switch for 12 seconds ± 1 second of discharge.



mmr2008-033-052_d

Use a multimeter and set it to Vdc.

Read capacitor voltage. Ensure to use the multimeter RED probe with the + terminal of capacitor.



mmr2008-033-052_b

CAPACITOR RESIDUAL VOLTAGE
Must be above 5 Vdc

If measurement is out of specification, replace capacitor.

Capacitor Removal

Remove tether cord from its post.

Discharge capacitor.

Disconnect capacitor terminals and unfasten capacitor.

Capacitor Installation

Discharge capacitor.

Install the capacitor.

Make sure to connect BLACK wire to negative terminal and RED/WHITE to positive terminal.

⚠ WARNING

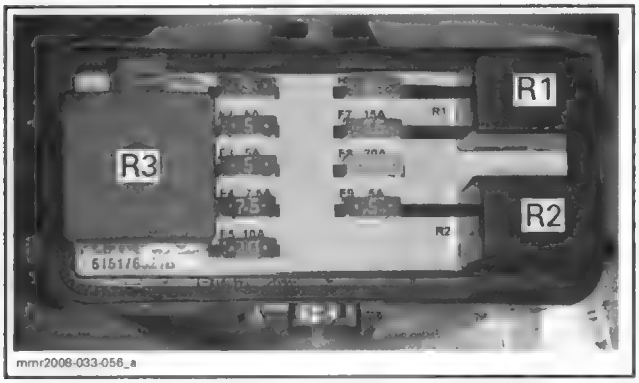
Always respect the polarity when connecting the capacitor.

Capacitor Relay (R1) Continuity Test

NOTE: The capacitor relay prevents the capacitor to be connected to the battery when the engine is not running to allow safe vehicle maintenance (disconnection and reconnection of the capacitor).

NOTE: Relays 1 and 2 work together. They are wired in palallel.

Remove relay 1 from fuse box.

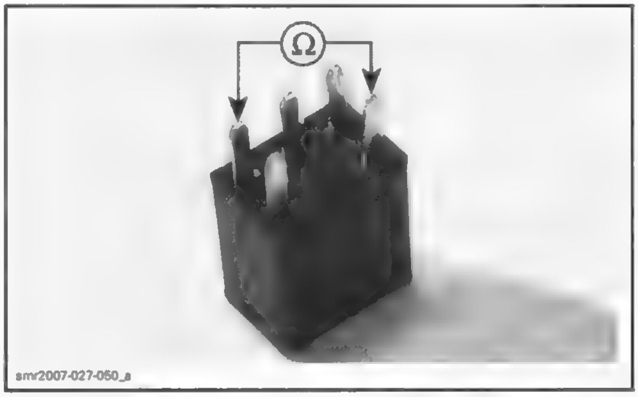


mmr2008-033-056_a

Use the Fluke 111 multimeter (P/N 529 035 868), and select the Ω position.

Probe relay as follows.

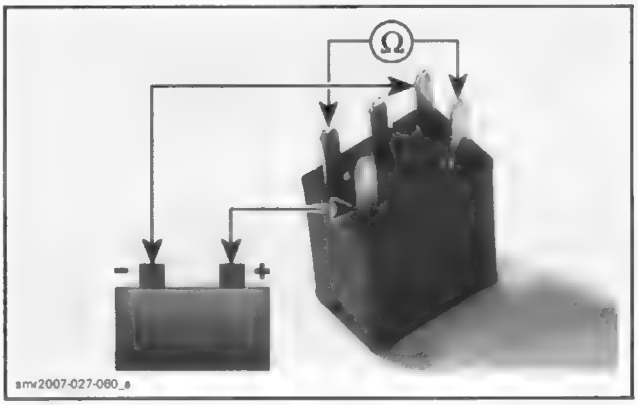
TERMINAL		RESISTANCE
30	87	Open circuit (0L)



smr2007-027-060_a

Connect battery as shown and probe relay again as follows.

TERMINAL		RESISTANCE
30	87	0.5 Ω max. (continuity)



smr2007-027-060_a

If relay failed any test, replace it.

IGNITION SYSTEM

SERVICE TOOLS

Description	Part Number	Page
ECM troubleshooting tool	420 277 010	287
digital inductive type tachometer	529 014 500	282
Fluke 111 multimeter	529 035 868	280
supply harness	529 035 869	291
supply cable	529 035 997	291
ignition timing tool	529 036 129	280

SERVICE PRODUCTS

Description	Part Number	Page
Loctite 767 (antiseize lubricant)	293 800 070	283

GENERAL

NOTE: On applicable models, it is good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to *MONITORING SYSTEM/FAULT CODES*.

It is important to check that the electrical system is not at fault:

- Fuses
- Power relay
- Ground connections
- Wiring connectors.

Check related-circuit fuse solidity and condition with an ohmmeter. Visual inspection could lead to false results.

Ensure that all electronic components are genuine.

Electrical Connections

Always check electrical connections. Make sure that they are very tight and they make good contact and that they are corrosion-free.

Check ECM ground and battery connections. Ensure that contacts are good and clean.

A "defective module" could possibly be repaired simply by unplugging and re-plugging the ECM. The voltage and current might be too weak to go through dirty wire pins. Check carefully if pins show signs of moisture, corrosion or if they look dull. Pay particular attention to ensure that pins are not out of their connectors or out of shape. The troubleshooting procedures cover problems not resulting from one of these causes.

NOTE: Ensure all terminals are properly crimped on wires and connector housings are properly fastened. Check if wiring harness shows any signs of scoring.

IGNITION SYSTEM TESTING SEQUENCE

In the case of ignition problems, check the following in the prescribed order until the problem can be solved.

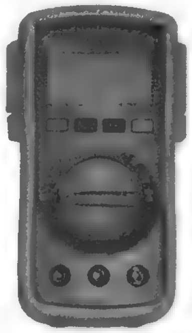
1. Spark plug
2. Wiring harness/electrical connectors
3. DESS post
4. Engine cut-out switch
5. Ignition coil
6. Trigger coil (**500SS/800R**)
7. CPS (**600 HO SDI**)
8. ECM (Engine Control Module).

Testing Conditions

Component temperature must be approximately 20°C (68°F) (room temperature), otherwise readings could be erroneous.

Tool

For best results, use the Fluke 111 multimeter (P/N 529 035 868).



Analysis of Readings

Resistance Readings

Readings must be within the indicated range. Otherwise, repair or replace the component.

Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing components. Many problems cannot be detected when the engine is stopped.

Multiple Problems

More than one component can be defective. As a result, if the problem remains although a component has been replaced, the entire testing procedure must be started over again from the beginning in order to identify the other defective component.

ADJUSTMENT

IGNITION TIMING

Normally, ignition timing adjustment should not be required. It has been set at factory and it should remain correctly adjusted since every part is fixed and not adjustable.

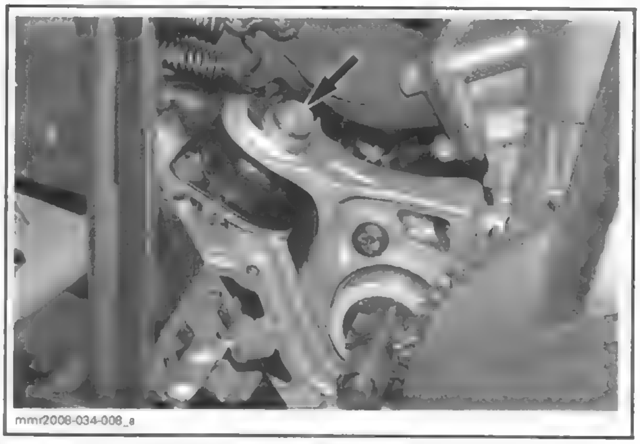
The only time the ignition timing might have to be changed would be when removing and reinstalling the magneto housing, replacing the crankshaft, the magneto flywheel, the trigger coil or the ECM. If the ignition timing is found incorrect, first check for proper crankshaft alignment. This might be the indication of a twisted crankshaft. Refer to *ENGINE MEASUREMENT* section.

PROCEDURE OVERVIEW
Scribe a timing mark
Check ignition timing with a timing light
Adjust timing if necessary using B.U.D.S. software

Scribing a Timing Mark

Ignition Timing Tool Installation

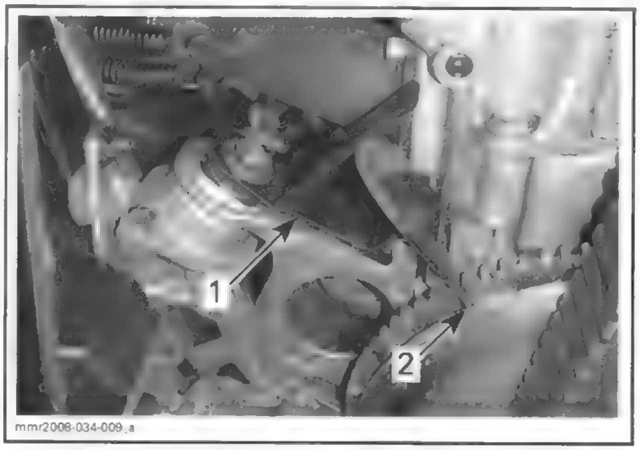
Remove the LH front engine mounting screw.



LH FRONT ENGINE MOUNT SCREW

NOTE: Note position of washers for installation.

Install the ignition timing tool (P/N 529 036 129) on the LH front engine mount.



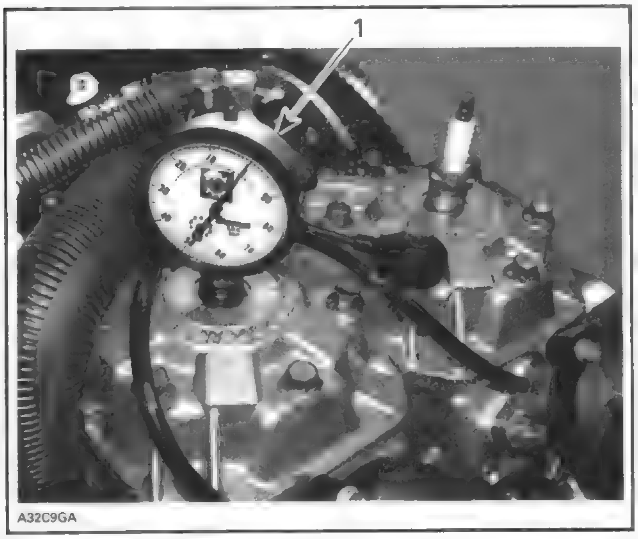
1. *Ignition timing tool*
2. *Pointer*

TDC Gauge Installation

Clean the area around the MAG spark plug, and remove it.

Install the TDC gauge in the spark plug hole, (magneto side) and adjust as follows:

- Position the MAG piston at approximately TDC.



TYPICAL
1. TDC gauge on MAG side

- Assemble the gauge to the adaptor and tighten the roller lock nut. Do not tighten the adaptor lock nut.
- Screw the adaptor into the spark plug hole and tighten to prevent movement in the plug hole.
- Position the dial face toward the PTO. Move the gauge down until the needle just begins to move, then move down a further 5 or 6 mm (approximately 1/4 in). Tighten adaptor lock nut by hand.

Locate the piston TDC position as follows:

- Slowly rotate the drive pulley back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
- Rotate the dial face so that "0" is in line with the needle when it stops moving.
- Again, slowly rotate the drive pulley back and forth across TDC and adjust the dial face to "0", until the needle always stops exactly at "0" before changing direction.
- "0" now indicates exact TDC.

Rotate the drive pulley clockwise, one-quarter turn then carefully rotate it counterclockwise until the needle indicates the specified measurement, indicated in *TECHNICAL SPECIFICATIONS*.

Scribing the Mark

With the TDC gauge indicating specified timing (refer to *TECHNICAL SPECIFICATIONS*, scribe a mark on drive pulley inner half in line with pointer end.

1
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1. Timing mark in line with pointer end

Checking Ignition Timing

The ignition timing can be checked with either the engine hot or cold at the specified RPM.

ENGINE SPEED TO CHECK IGNITION TIMING	
MODELS	ENGINE RPM
500SS and 800R	3500 (1)
600 HO SDI	4000

(1) In the 3000 to 4000 RPM range, the spark advance does not change. Therefore, at 3500 RPM, a change in engine speed of ± 500 RPM will not affect the timing mark.

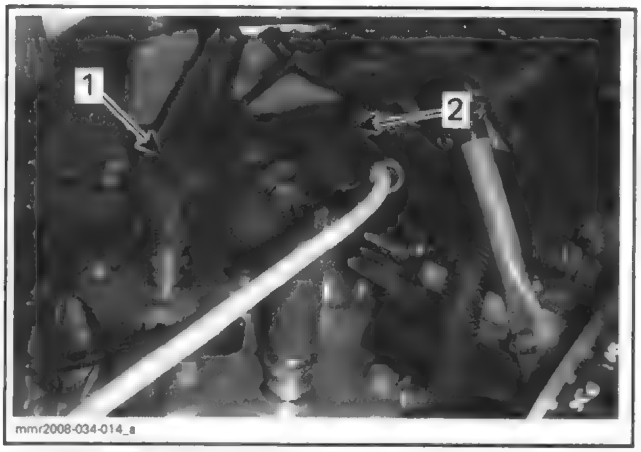
To check the ignition timing proceed as follows:

⚠ WARNING

Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground. Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

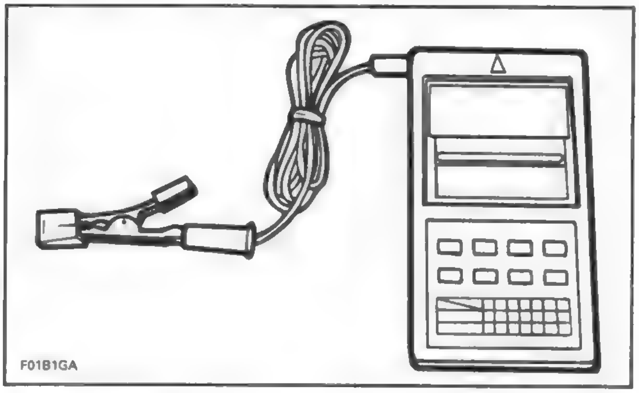
NOTE: On **800R models**, unplug TPS connector.

Connect the timing light pick-up to the **MAG** side spark plug cable.



TIMING LIGHT CONNECTION
1. *MAG side spark plug*
2. *Timing light connection to MAG plug cable*

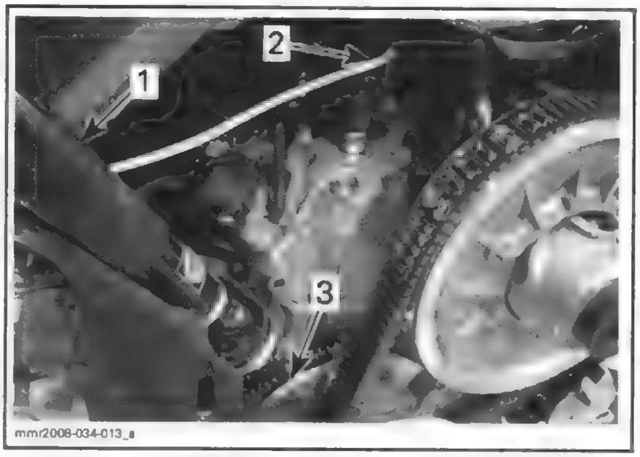
Connect the digital inductive type tachometer (P/N 529 014 500) to a spark plug cable.



TACHOMETER

CAUTION: Before starting engine, check cable routing of test equipment to make sure it cannot come into contact with rotating parts or with the exhaust manifold.

Start the engine and point timing light on timing mark. Bring engine to the specified RPM for a brief instant.



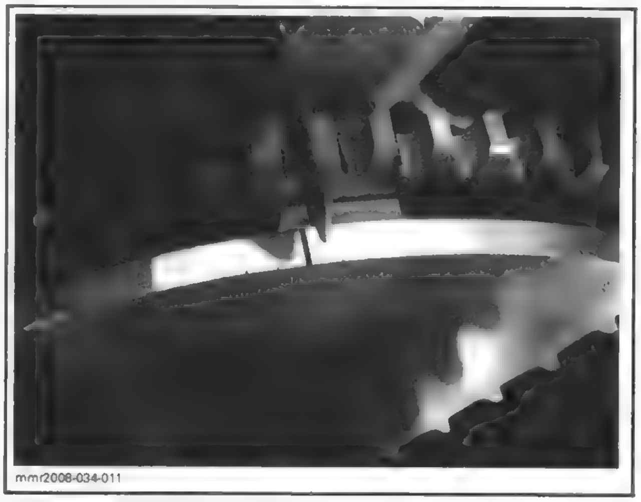
1. *Inductive timing light*
2. *Timing light cable to MAG plug*
3. *Timing mark/pointer alignment*

The timing mark must be aligned with the pointer end within the specified tolerance.

MODEL	TOLERANCE
500SS, 800R	± 1°
600 HO SDI	± 0.5°

If marks are aligned, no adjustment is required.

If marks are not aligned, note if timing is retarded or advanced as shown. Then, adjust timing as described below.



TIMING RETARDED BY ABOUT 1°

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TIMING ADVANCED BY ABOUT 2°

Adjusting Timing

Use the latest B.U.D.S. software available from BOSSWeb. Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* section.

Uses the **Setting** tab to change the ignition timing.

Detailed information about the B.U.D.S. software and its usage is available under its **Help** section.

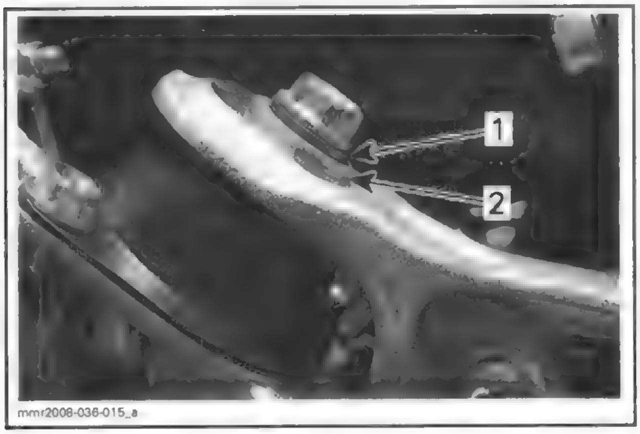
NOTE: On **800R models**, ensure to reconnect TPS connector.

Parts Reinstallation

When ignition timing procedure is completed, remove all tools.

Install engine mounting bolt and torque to 25 N•m (18 lbf•ft).

NOTE: Install the flat washer first then the conical washer.



1. *Conical washer*
2. *Flat washer*

PROCEDURES

SPARK PLUG

Spark Plug Removal

First unscrew the spark plug 1 turn.

Clean the spark plug and cylinder head with pressurized air, then completely unscrew and remove spark plug.

⚠ WARNING

Whenever using compressed air, always wear protective eye wear.

Spark Testing

Use the spark plug installed in the snowmobile engine and not a new one. Bring the plug in contact with the engine. Pull rewind starter. If no spark is produced, replace the spark plug with a new one and redo the test again.

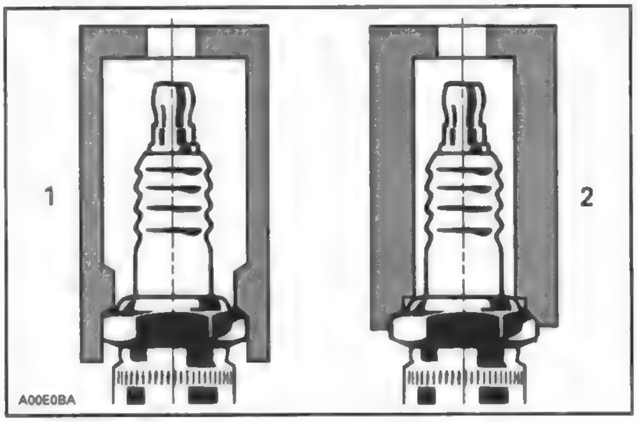
If there is still no spark, continue testing.

Spark Plug Installation

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

Using a feeler gauge, set electrode gap (except if spark plug is an ECS type) as per *TECHNICAL SPECIFICATIONS*.

1. Apply Loctite 767 (antiseize lubricant) (P/N 293 800 070) over the spark plug threads to prevent possible seizure.
2. Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



TYPICAL
1. *Proper socket*
2. *Improper socket*

Use the following table to torque the spark plug.

MODEL	SPARK PLUG	TORQUE N•m (lbf•ft)
All	NGK	27 (20)

DESS POST

Refer to *DIGITALLY ENCODED SECURITY SYSTEM (DESS).*

ENGINE CUT-OUT SWITCH

Engine Cut-Out Switch Operation

The cut-out switch provides a ground signal to the ECM when STOP is selected.

500SS/800R

The ground signal is applied to the ECM connector pin 23, through the cut-out switch (STOP position).

600HO SDI

The ground signal is applied to the ECM connector "B" pin 21, through the cut-out switch (STOP position).

Refer to applicable *WIRING DIAGRAM* for details.

Cut-Out Switch Troubleshooting

Engine Will Not Start, No Spark

If the engine will not start and you do not have spark at the spark plugs, the cut-out switch wiring to the ECM may be shorted to ground.

Isolate (disconnect) the cut-out switch from the wiring harness and the applicable ECM connector.

Test the cut-out switch as per procedure in this section.

Test the wiring harness wire to the cut-out switch and the wire to the ECM to make sure they are not shorted to ground. Refer to the appropriate *WIRING DIAGRAM* for circuit details.

You should have continuity through the wire, but infinite resistance to ground.

If a low resistance to ground is found, repair or replace wiring.

Engine Will Not Stop

Test cut-out switch as per procedure in this section.

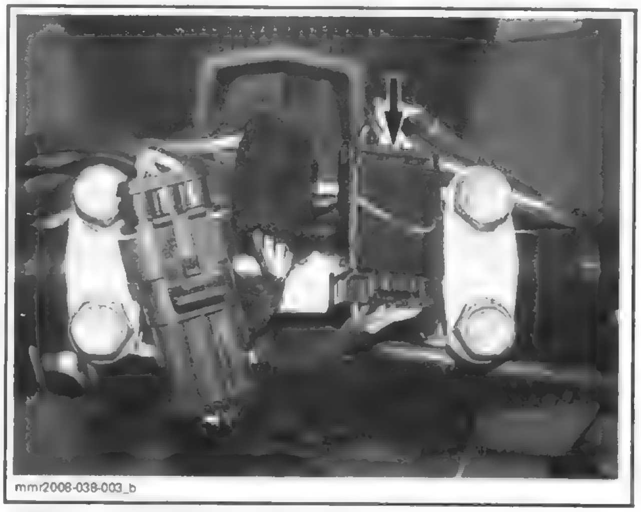
Test continuity of entire cut-out switch circuit from ECM to ground, refer to the appropriate *WIRING DIAGRAM* for circuit details.

If cut-out switch circuit is found to be open, repair or replace switch, wiring, or connections.

Engine Cut-Out Switch Resistance Test

To test the cut-out switch, carry out the following steps.

Disconnect the 6 pin connector under the steering cover.



TYPICAL — SDI MODEL SHOWN

Set multimeter to Ω.

Measure the resistance between the BLACK wire and the BLACK/YELLOW wire as follows.

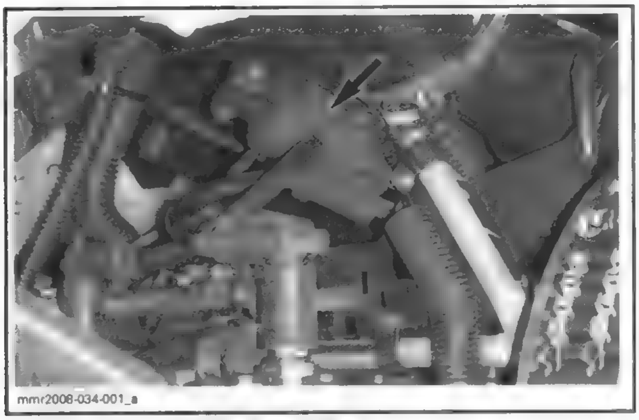
ENGINE CUT-OUT SWITCH TEST		
SWITCH POSITION	RUN	STOP
RESISTANCE BK to BK/YL	OL	0 to 0.5 Ω

If readings do not correspond to the above mentioned indications, check switch wires/connector and if good, replace switch.

IGNITION COIL

500SS/800R

The ECM energizes the primary side of the ignition coil.



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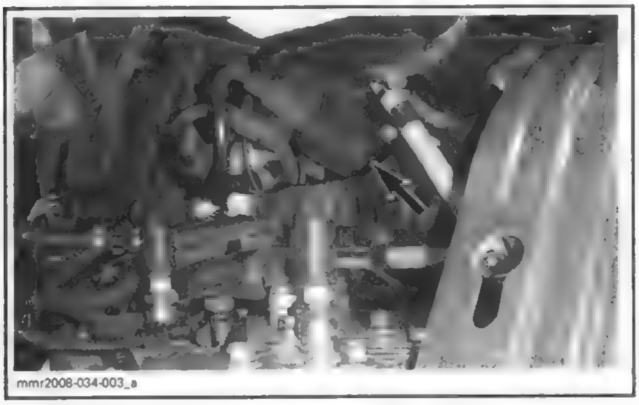
IGNITION COIL (LEFT FRONT VIEW)

600 HO SDI

Double ignition coil has two separate windings, one for each spark plug.



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IGNITION COIL

Ignition coil induces voltage to a high level in the secondary windings to produce a spark at the spark plug.

This ignition system allows spark plugs to spark independently.

CAUTION: Do not interchange spark plug cables. Match reference (PTO or MAG printed on high tension cable yellow tag) with corresponding cylinder spark plug.

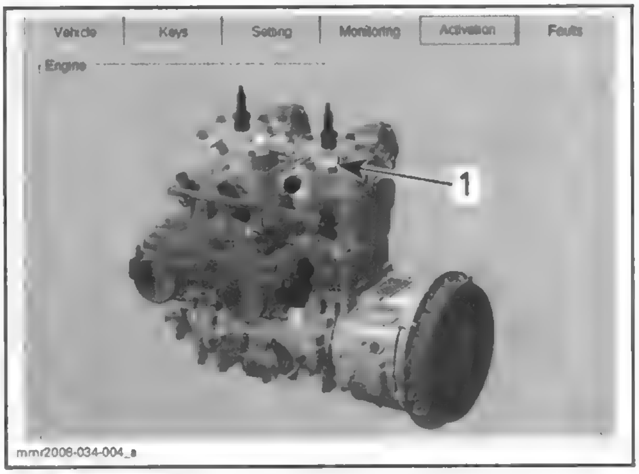
Two separate windings circuits are switched to ground through the ECM. Each winding induces high voltage to its corresponding secondary winding to produce a spark.

NOTE: The ECM energizes the primary winding of each ignition coil individually. It can detect if the double ignition coil is connected and display a trouble code in the multifunction display and a **CHECK ENGINE** upon engine starting.

Ignition Coil Test With B.U.D.S.

Use the latest B.U.D.S. software available from BOSSWeb. Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* section.

Energize each **ignition coil** from within the **Activation** tab.



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1. *Activate here*

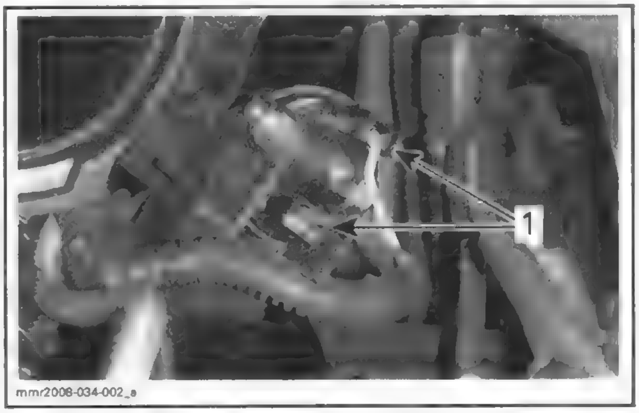
You should hear the spark occurring. If in doubt, use an inductive spark tester.

Ignition Coil Resistance Test

500SS/800R

Disconnect primary winding terminals from ignition coil and spark plug cables from spark plugs.

Using a multimeter, check winding resistance as follows.



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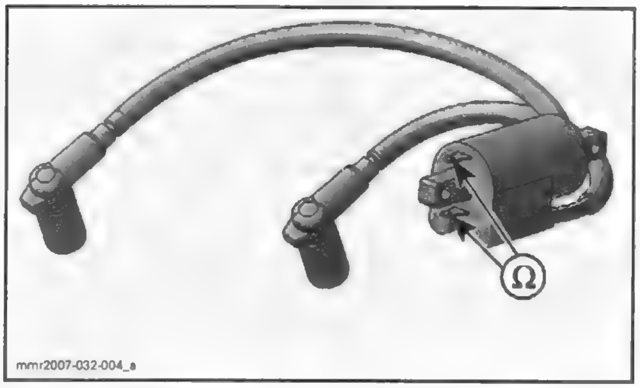
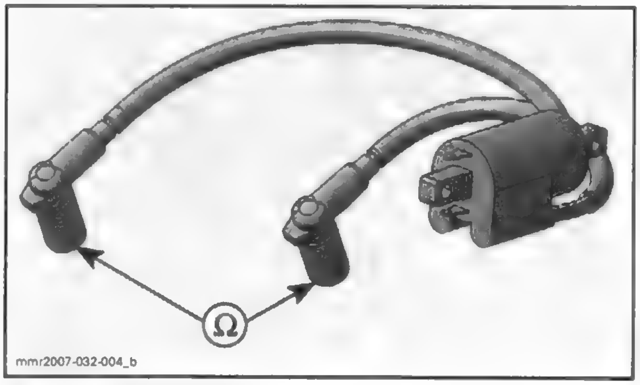
IGNITION COIL (SEEN FROM BEHIND)
1. *Primary winding terminals*

WINDING	RESISTANCE @ 20°C (68°F)
Primary	0.3 - .7 Ω
Secondary	18 kΩ - 26 kΩ with spark plug caps



PRIMARY WINDING



SECONDARY WINDING

If resistance readings are out of specification, replace ignition coil.

NOTE: Keep in mind that an ignition coil with good resistance measurements can still be faulty. Voltage leak can occur at high voltage levels which is not detectable with an ohmmeter. Replacing the ignition coil may be necessary as a test.

600 HO SDI

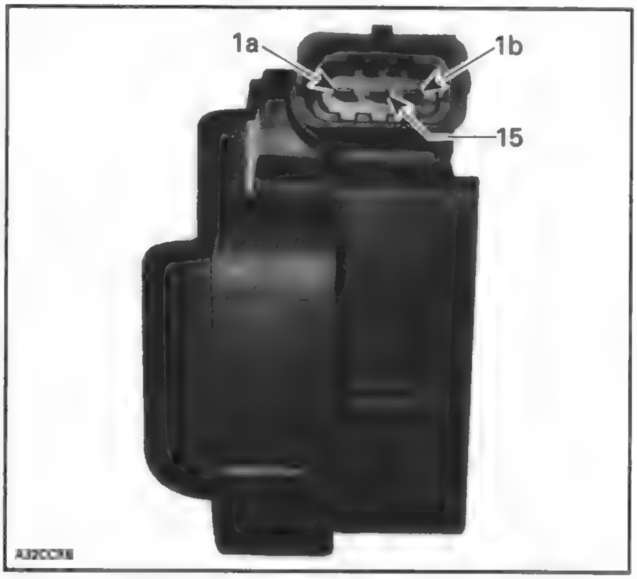
To ease access, remove ignition coil from vehicle, refer to *IGNITION COIL REMOVAL* in this section.

Using a multimeter, check the resistance of primary winding.

NOTE: The secondary winding can not be measured with an ohmmeter. Try a new double ignition coil if necessary.

Check the resistance of the primary winding as follows.

CYLINDER	IGNITION COIL TERMINAL	RESISTANCE @ 20°C (68°F)
1	15 and 1a	0.40 and 1.15 Ω
2	15 and 1b	



If any resistance is out of specification, replace the ignition coil.

If the windings test good, try a new ECM.

Reinstall coil assembly, refer to *IGNITION COIL INSTALLATION* in this section.

⚠ WARNING

Always reconnect ignition coil cables to the same spark plugs where they were disconnected from. Otherwise, severe backfire may occur with possible damage to exhaust system components.

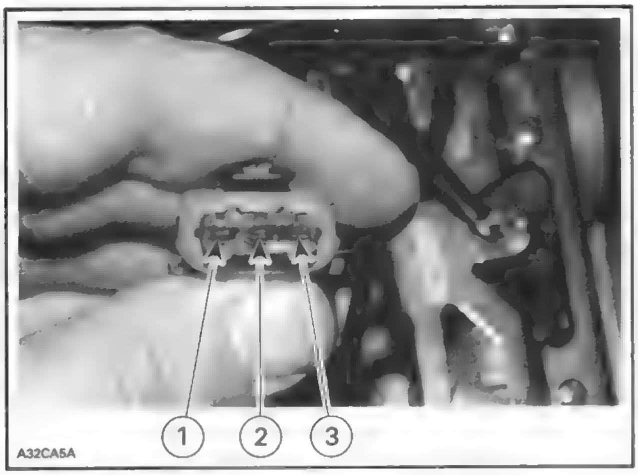
Ignition Coil Input Voltage Test

600 HO SDI Electric Start

Disconnect the small connectors from the starter solenoid. This will prevent the starter from rotating the engine.

Remove the primary air intake silencer. Refer to *AIR INTAKE SYSTEM* section.

Disconnect the primary connector from the ignition coil.



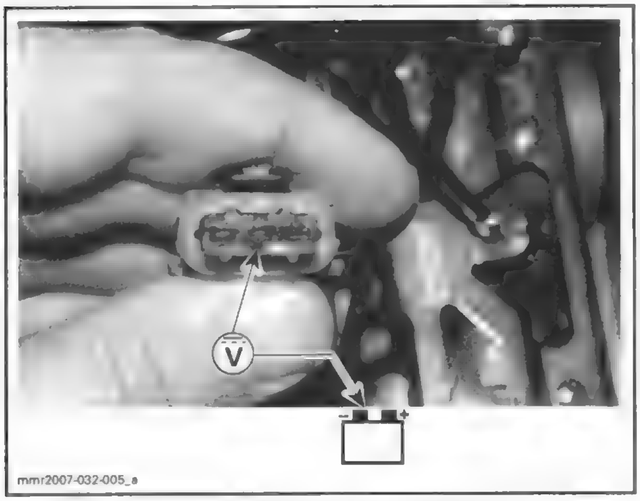
TYPICAL — IGNITION COIL CONNECTOR

Install the **tether cord cap** on the DESS post.

Press the START/RER button momentarily to activate the ECM.

Check voltage as follows.

TERMINAL		VOLTAGE (Vdc)
2	Battery ground	Battery voltage



INPUT VOLTAGE TEST (PRIMARY COIL WINDING)

If battery voltage is NOT read, check continuity between terminal 2 of ignition coil and the corresponding fuse (F5). Repair or replace wiring as required.

If battery voltage is read, check the following:

- Ignition coil resistance test.
- Continuity test of primary coil winding circuit to ECM.

Reconnect connectors previously removed.

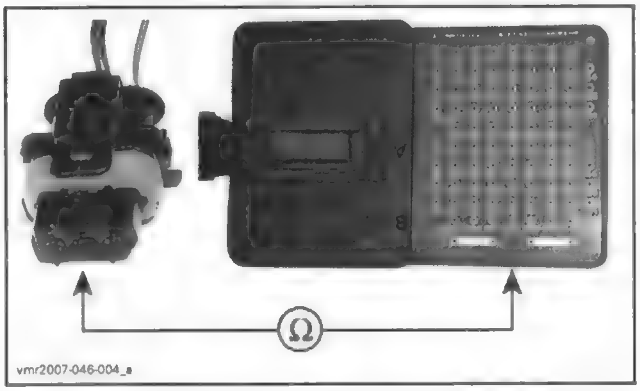
Continuity Test (Ignition Coil Control Circuit)

600 HO SDI Electric Start

Disconnect connector "A" from the ECM and install it on the ECM troubleshooting tool (P/N 420 277 010).

Test for continuity of the circuit between ECM connector and ignition coil connector as follows.

CYLINDER	CONNECTOR PIN		RESISTANCE
	ECM "A"	IGNITION COIL	
1	A-41	3	Close to 0 Ω (continuity)
2	A-1	1	



If wiring harness is defective, repair the connector or replace the wiring harness between ECM connector and the ignition coil.

If wiring harness is good, test resistance of primary winding of ignition coil.

Ignition Coil Removal

Note position of spark plug cables and remove them from the spark plugs.

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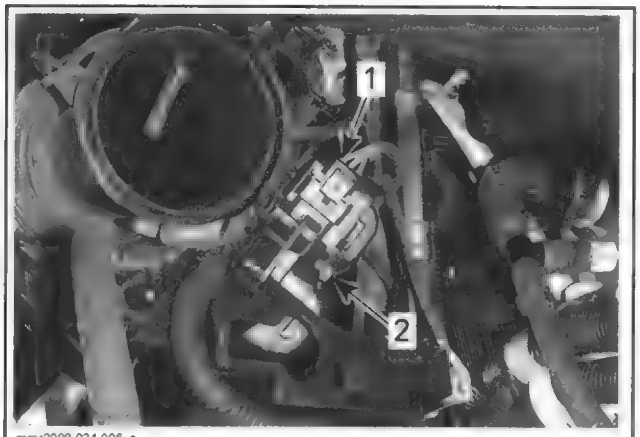
600 HO SDI IGNITION COIL (FRONT VIEW)

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM* section.

Disconnect ignition coil primary winding connector.

Remove the coil retaining screw in the center of the two coils.



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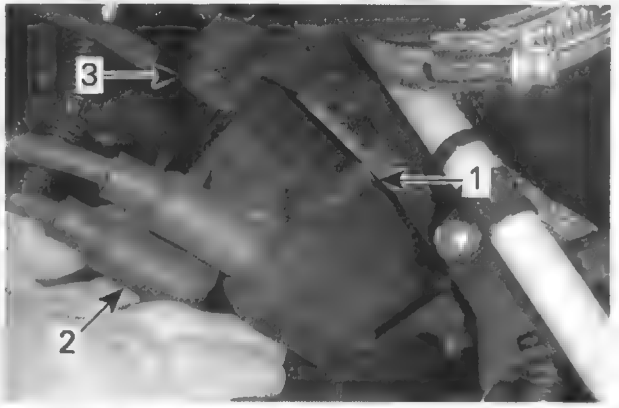
600 HO SDI IGNITION COIL (REAR VIEW)
1. Primary winding connector
2. Coil retaining screw

Remove coil from retaining bracket.

Ignition Coil Installation

Position coil as per illustration.



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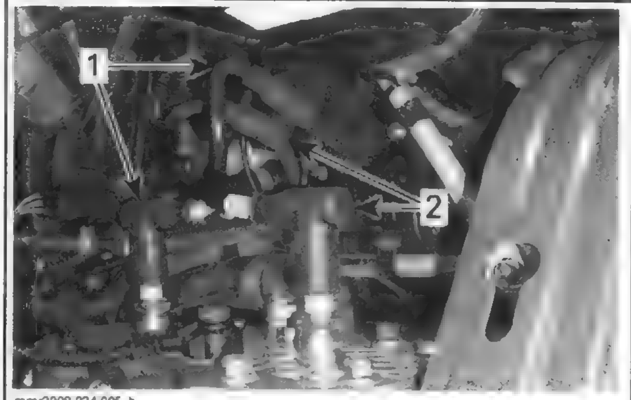
COIL INSTALLATION
1. Retaining screw post
2. Spark plug cable position
3. Coil mounting bracket

Install the retaining screw and torque to 10 N•m (89 lbf•**in**).

Reconnect the primary winding connector and the spark plug cables.

NOTE: Pay attention to the position of the spark plug cables when connecting them.



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1. MAG plug cable connection
2. PTO plug cable connection

⚠ WARNING

Always reconnect ignition coil cables to the same spark plugs where they were disconnected from. Otherwise, severe backfire may occur with possible damage to exhaust system components.

TRIGGER COIL

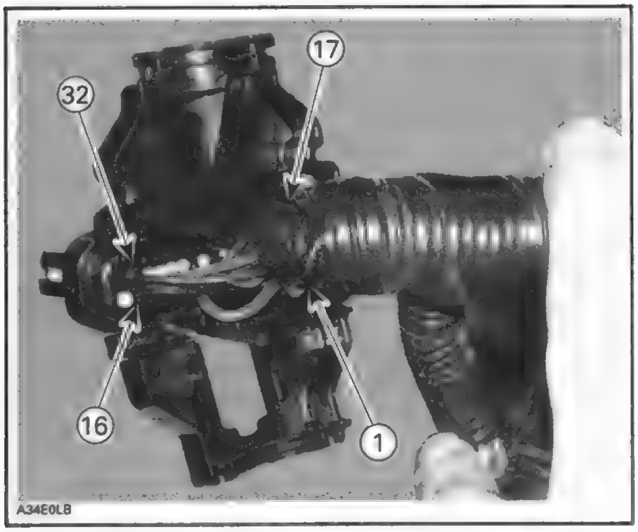
500SS/800R

The ECM receives a signal from each of two trigger coils which it uses for establishing spark timing.

NOTE: Both trigger coils work all the time.

Check the resistance and the voltage for each trigger coil at the ECM connector.

TEST	CONTINUITY		OUTPUT	
TEST PROBES	Trigger coil #1	Trigger coil #2	Trigger coil #1	Trigger coil #2
	Pin 17 and 35	Pin 18 and 36	Pin 17 and 35	Pin 18 and 36
RESISTANCE	190 to 300 Ω	190 to 300 Ω	—	—
VOLTAGE	—	—	.200 to .350 Vac	.200 to .350 Vac
NOTE	—	—	While cranking engine	While cranking engine



ECM CONNECTOR PINOUT

If a trigger coil is out of specification, replace it. Refer to the *MAGNETO SYSTEM* section.

CRANKSHAFT POSITION SENSOR (CPS)

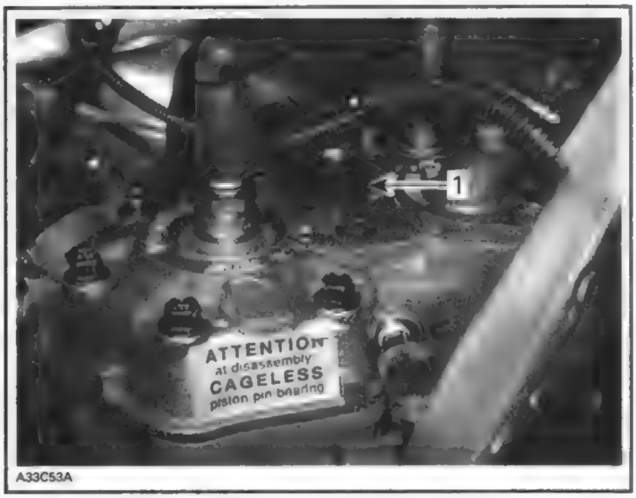
600 HO SDI

To test CPS, Refer to *SEMI-DIRECT INJECTION (SDI)* section.

KNOCK SENSOR (KS)

800R

NOTE: For 600 HO SDI, refer to *SEMI-DIRECT INJECTION (SDI)* section.



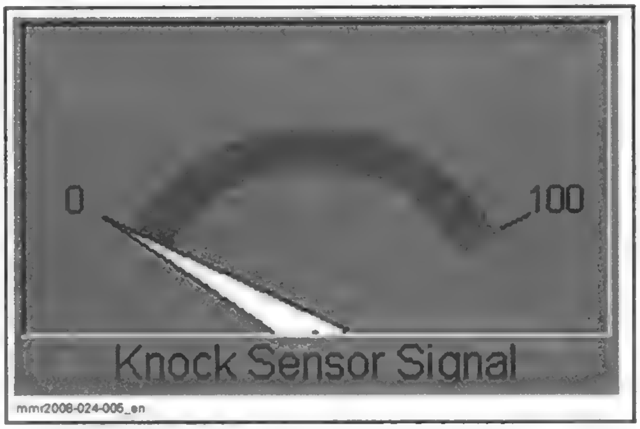
1. *Knock sensor (KS)*

KS Dynamic Test

Lift rear of vehicle off the ground and support it with a wide-base mechanical stand.

Use B.U.D.S. software.

Monitor the knock sensor using the **Knock sensor signal** in **Monitoring** section in B.U.D.S.



MONITORING TAB

Start the engine.

Bring engine speed above 5200 RPM and vary engine RPM above 5200 RPM.

Needle of knock sensor signal should move between 0 and 100. The needle movement pattern is of no importance as long as it moves indicating the engine vibrations the knock sensor senses. If needle "sticks" either to 0 or 100, there is a problem.

If needle moves as described, the knock sensor should be good.

Otherwise, do the following.

NOTE: Ensure ignition coil cables are not close to knock sensor harness. This might generate a false fault code.

NOTE: Fault code P1326 might occurs but it is not related with a knock sensor failure. If this code occurs, refer to B.U.D.S. for proper action to take.

Verify knock sensor circuit as follows.

KS Circuit Continuity Test

Ensure sensor and head contact surfaces are clean and mounting bolt and washer are correct and properly torqued down.

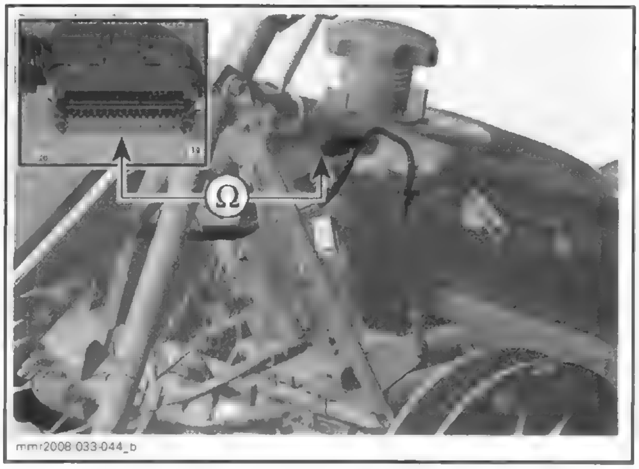
Check the knock sensor circuit on wiring harness.

Disconnect knock sensor connector. Refer to *KNOCK SENSOR REPLACEMENT.*

Disconnect ECM connector.

Check wire continuity of circuit as per following table.

CIRCUIT NUMBER (ECM CONNECTOR)	KS CONNECTOR
DA-2	Pin 1
DA-20	Pin 2



If test is not good, repair/replace wiring/connectors between ECM and knock sensor.

If test is good, try a new knock sensor.

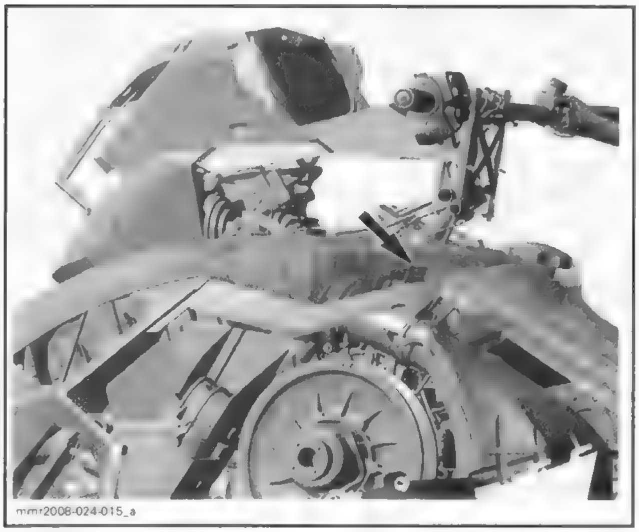
KS Replacement

Unscrew and remove knock sensor from cylinder head.

Remove pulley guard. Refer to *DRIVE SYSTEM/ BRAKE.*

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM.*

Unplug knock sensor connector above ATS.



Clean contact surface, then install the new knock sensor.

Torque screw to 29 N•m (21 lbf•ft).

CAUTION: Improper torque might prevent sensor to work properly and lead engine to severe damage of internal components.

Reconnect connector.

Reinstall remaining parts.

ENGINE CONTROL MODULE (ECM)

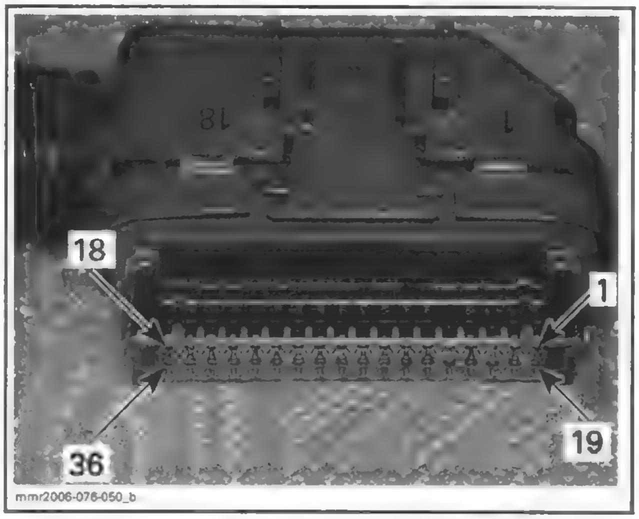
500SS/800R

Use the latest B.U.D.S. software available from BOSSWeb for the following procedures. Refer to *COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE* for proper connection instructions.

IMPORTANT: Engine-related sensors and actuators are continuously powered when engine runs. **The ECM switches the ground to complete the electrical circuits it controls.** Take this into account when troubleshooting the electrical system.

ECM Connector Pin Identification

Use the following illustration to locate the pin numbers on the ECM connector (wiring harness side) when performing tests.



ECM Power

At cranking, the magneto sends AC current to the voltage regulator/rectifier that in turn, supplies the ECM with DC voltage. The ECM then supplies the ignition for engine starting.

When engine runs and reaches approximately 800 RPM, the ECM activates the power relay that in turn, supplies the electrical loads (lights, accessories etc).

ECM Power Supply

Power (Vdc)	Pin 14
Ground	Pin 16

ECM Power Supply Troubleshooting

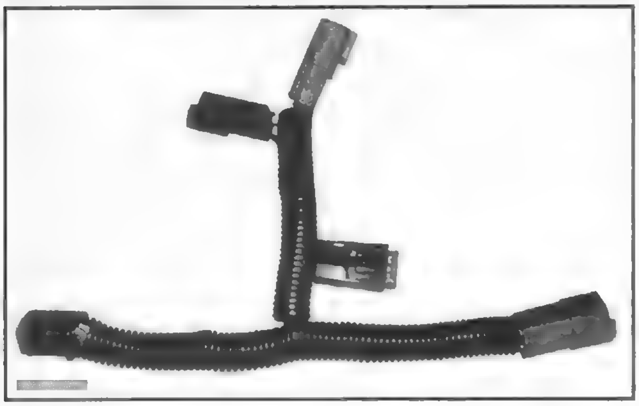
Connect supply harness (P/N 529 035 869) to the 6-pin diagnostic connector of vehicle.

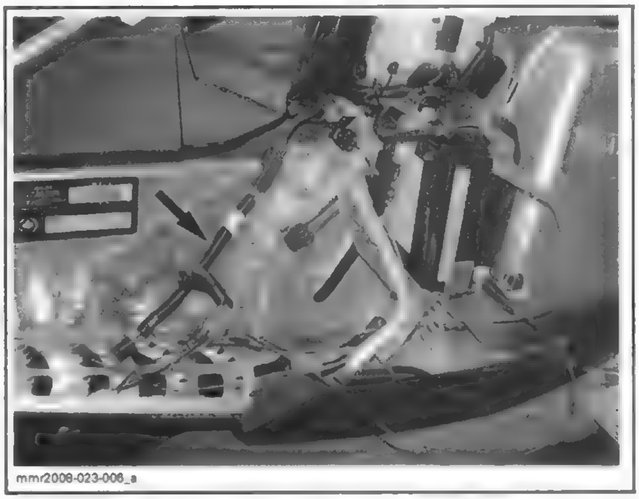
Connect supply cable (P/N 529 035 997) to supply harness.

Connect supply harness clips to vehicle battery. Ensure to match RED wires together and BLACK wires together.

NOTE: On manual start models, use an external 12 V battery.

529035997





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CAUTION: Always use the proper supply harness and cables. Ensure to respect polarity when connecting cable clips to battery. Match RED cables together.

NOTE: It is suggested to disconnect headlamp or to connect a battery charger to reduce battery discharge rate.

IMPORTANT: When using the supply harness, ignition is disabled. Therefore, no engine starting can take place.

Set engine cut-out to RUN.

Observe multifunction gauge and listen to the beeper. Use this table for the proper action to take.

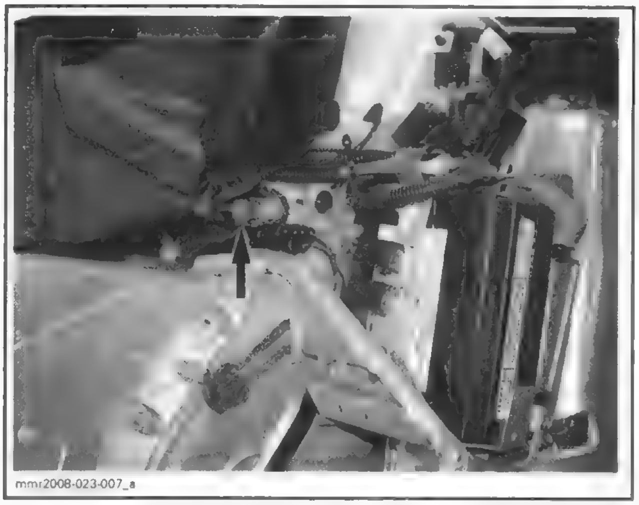
OBSERVATION	ACTION TO TAKE
2 beeps were heard and the multifunction gauge turned on	Normal condition. ECM and multifunction gauge are properly powered.
No beeps were heard and the multifunction gauge did not turn on	Check DC voltage output from voltage regulator/rectifier. Refer to *CHARGING SYSTEM.*
Only 2 beeps were heard	Check multifunction gauge power supply. Refer to *LIGHTS/GAUGE/ ACCESSORIES.*
Only multifunction gauge turned on. Communication error was displayed in multifunction gauge.	Perform *ECM POWER SUPPLY TEST* described below.

Disconnect supply harness.

ECM Power Supply Test

Open RH side panel.

Pull out diagnostic connector.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Use a multimeter and set it to Vdc.

Set engine cut-out switch to the STOP position.

500SS/800R Electric Start

Electric starter can be used for the test as follows.

Disconnect ORANGE/BLACK wire from starting solenoid.

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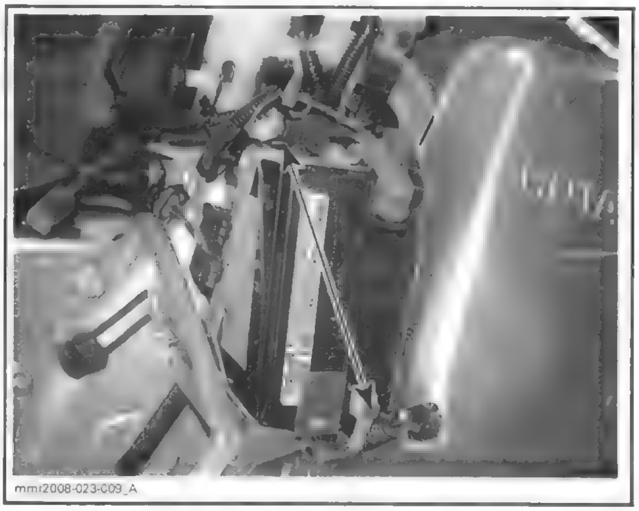
Install a jumper wire between solenoid connector and battery ground.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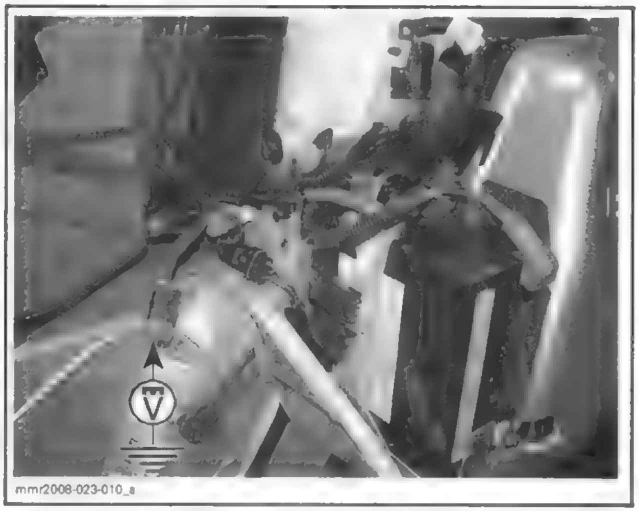
Press START/RER button to crank engine.

All 500SS/800R

While cranking engine, read voltage as follows.

MULTIMETER PROBES		VOLTAGE
Diagnostic connector pin 4	Chassis ground	Manual start: approx. 2-3 Vdc, electric start: approx. 6 Vdc



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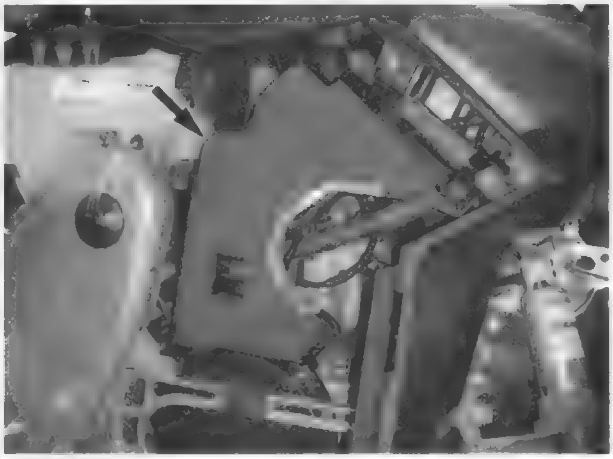
- If voltage is as per specification, check ECM Ground Circuit. Refer to *ECM GROUND CIRCUIT TEST.*
- If voltage is not as per specification, check ECM Power Circuit. Refer to *ECM POWER CIRCUIT CONTINUITY TEST.*

ECM Ground Circuit Test

Remove muffler. Refer to *EXHAUST SYSTEM.*

Remove the acoustic panel.



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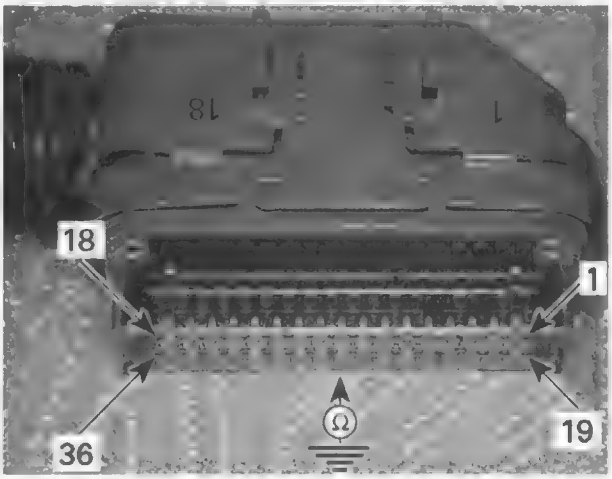
Disconnect ECM connector.

Set multimeter to Ω.

Read wiring resistance as follows.

ECM CONNECTOR	RESISTANCE
Pin 16 with frame ground	Close to 0 Ω



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If reading is out of specification, check/repair wiring/connectors.

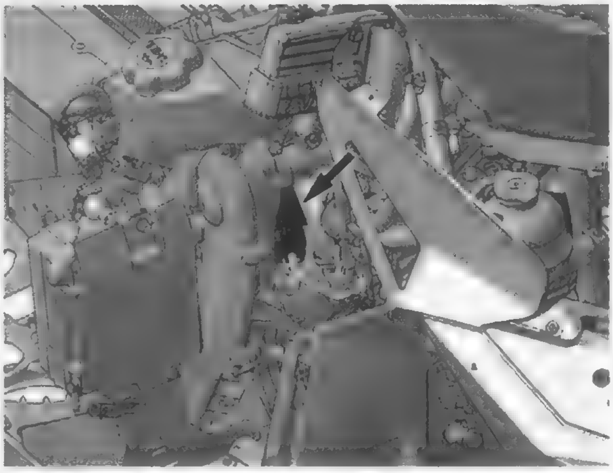
If reading is as per specification, ground circuit is good. check ECM Power Circuit. Refer to *ECM POWER CIRCUIT CONTINUITY TEST.*

ECM Power Circuit Continuity Test

IMPORTANT: Disconnecting ECM connector and reading voltage on connector terminal would give false results. ECM connector **must be connected to ECM** to be able to read the voltage. Since it cannot be easily achieved, a continuity test will be done instead.

Disconnect ECM connector.

Disconnect voltage regulator/rectifier connector.



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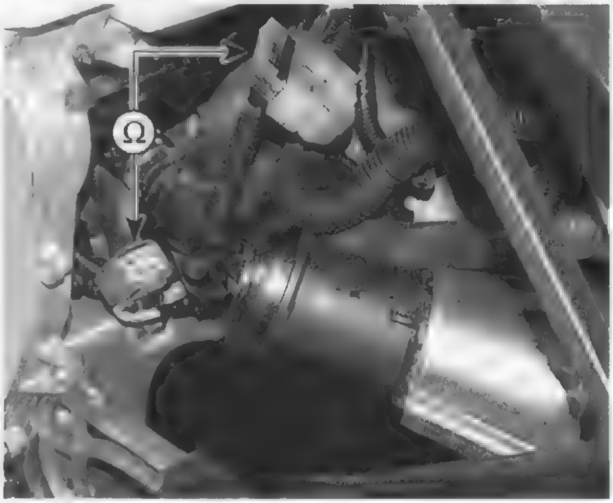
Set multimeter to Ω.

Read wiring resistance as follows.

ECM CONNECTOR	VOLTAGE REGULATOR	RESISTANCE
Pin 14	RED/BLUE	Close to 0 Ω



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If reading is out of specification, check/repair wiring/connectors.

If reading is as per specification, check DC voltage output from voltage regulator/rectifier. Refer to *CHARGING SYSTEM.*

Reinstall removed parts.

ECM Replacement

ECM Removal

Disconnect battery cables on electric start models.

⚠ WARNING

Battery BLACK (-) cable must always be disconnected first and connected last.

Remove muffler. Refer to *EXHAUST SYSTEM.*

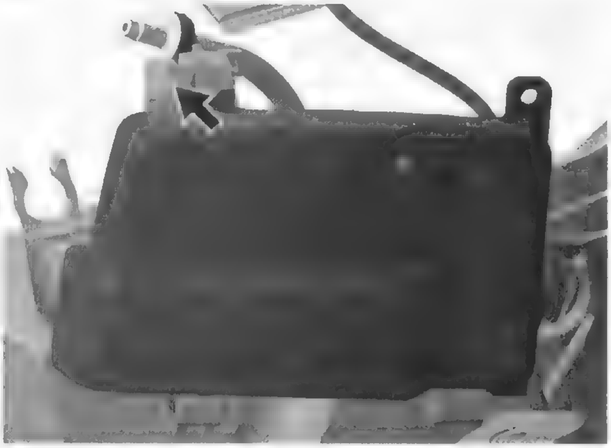
Remove the acoustic panel.

Cut locking ties as necessary.

Disconnect ECM connector.

Remove ECM as follows.

1. Push the LH upper tab and hold.



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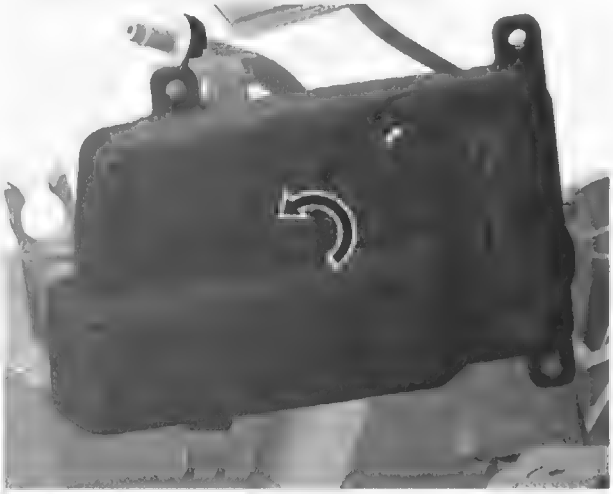
2. Rotate ECM counterclockwise.



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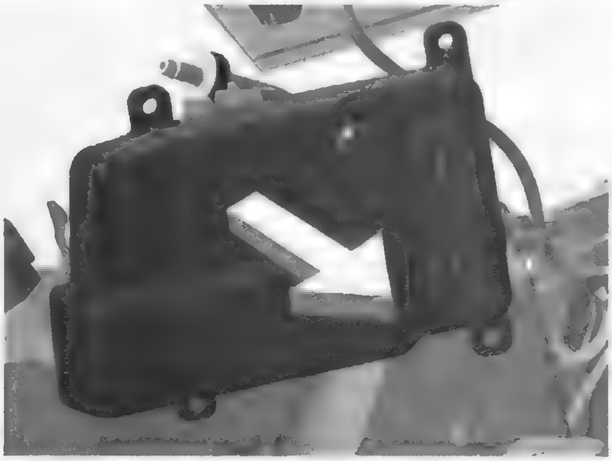
3. Pull out ECM.



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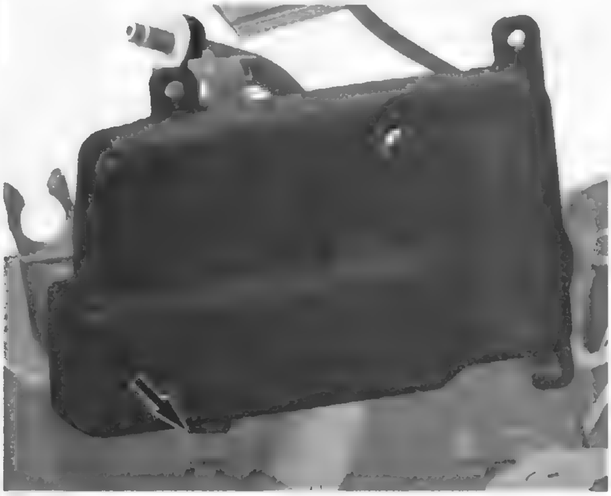
ECM Installation

Install ECM as follows.

1. Insert the LH bottom tab of ECM first.



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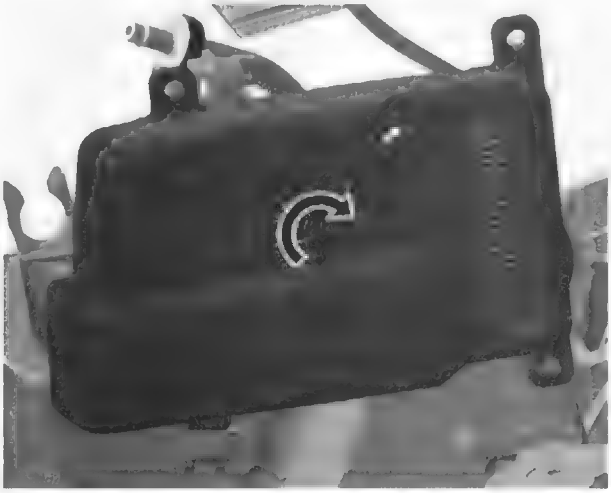
2. Rotate ECM clockwise until the other tabs are engaged and ECM locks in position.



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Reconnect ECM connector and then battery cables (if applicable).

Use B.U.D.S. software and do the following.

- Enter the proper information in **Vehicle** tab.

CAUTION: Pay particular attention when typing the VIN and model numbers. Once Write Data button is pressed, numbers cannot be modified.

- Reprogram DESS key. Refer to *DESS SYSTEM.*
- Set the ignition correction. Refer to *IGNITION SYSTEM.*
- Set the cluster units. Refer to *LIGHTS/GAUGE/ACCESSORIES.*

Start the engine to be sure no fault appears.

Reinstall removed parts.

CHARGING SYSTEM

SERVICE TOOLS

Description	Part Number	Page
Fluke 111 multimeter	529 035 868	297
4-pin magneto diagnostic harness	529036021	304

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
NAPA ULTRA PRO battery load tester	95260	305

SERVICE PRODUCTS

Description	Part Number	Page
silicone dielectric grease	293 550 004	307

GENERAL

NOTE: On applicable models, it is good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to *MONITORING SYSTEM/FAULT CODES*.

Component temperature must be approximately 20°C (68°F) (room temperature) when taking measurements, otherwise readings could be erroneous.

For best results, use the Fluke 111 multimeter (P/N 529 035 868).

Magneto

A magneto provides the primary source of electrical energy. It transforms a magnetic field into an alternating current (AC).

The magneto is comprised of a 3 phase delta wound stator. It has a capacity of 480 watts for the **600 HO SDI models**, and 360 watts for the **500SS and 800R models**.

AC current is rectified and regulated by a voltage regulator between 13.4 and 15 volts DC for primary power to the vehicle electrical system, and to charge the battery on electric start models.

Battery

On electric start models, never use a battery charger to substitute temporarily the battery, as it may cause the ECM (engine control module) to work erratically or not to work at all.

500SS/800R

On these models, a battery is installed as a secondary power source. It is primarily used for energizing the starter on electric start models.

600 HO SDI (Manual Start)

These models are equipped with a small 3A battery. This battery is required to power up the ECM and the fuel pump on starting.

600 HO SDI (Electric Start)

These models are equipped with a 20 A battery. This battery is required to power up the ECM and the fuel pump on starting as well as provided power to the starter for cranking the engine.

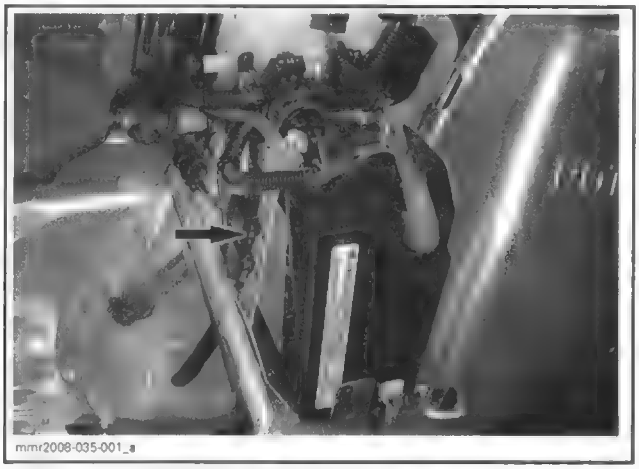
PROCEDURES

CHARGING FUSE

500SS/800R Electric Start and 600 HO SDI Manual Start

Fuse Location

A 30 A charging system fuse is located on the LH side of the battery retaining strip.



TYPICAL – CHARGING SYSTEM FUSE

NOTE: The voltage regulator could be the culprit of a blown charging system fuse. To check, simply disconnect the regulator from the circuit. If the fuse still burns, check for a defective wire.

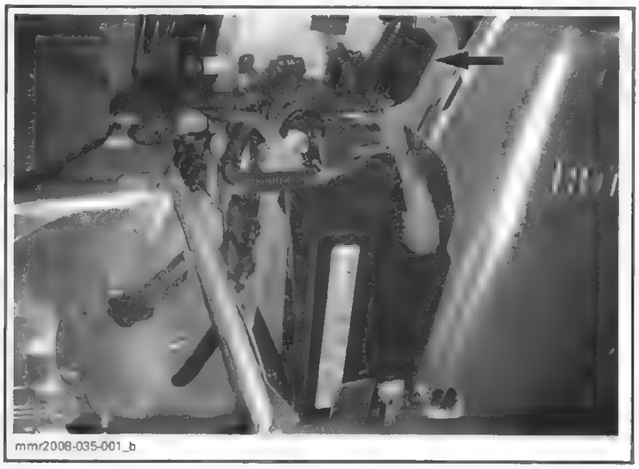
CHARGING RELAY (R2)

500SS/800R

A charging relay (R2), completes the charging circuit between the voltage regulator output and the battery, at approximately 800 RPM. It receives its ground control signal from the ECM. Refer to *WIRING DIAGRAM* for more details.

Charging Relay Location

The charging relay is a plug-in relay located next to the battery on a harness connector.

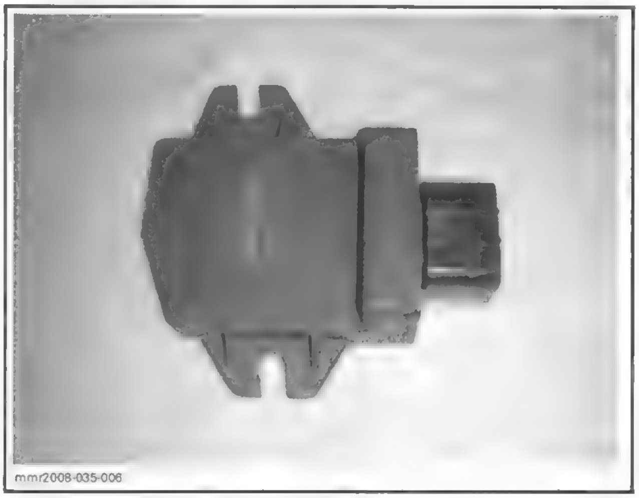


TYPICAL – CHARGING RELAY R2

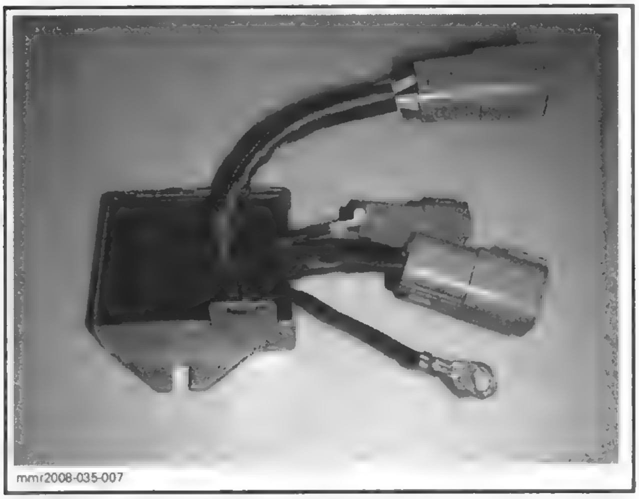
VOLTAGE REGULATOR

Voltage Regulator Continuity Test

Due to internal circuitry, there is no static test available to check continuity.



VOLTAGE REGULATOR (500SS/800R)



VOLTAGE REGULATOR (600 HO SDI)

DC Voltage Output Test (Voltage Regulator)

500SS/800R Manual Start

Proceed as follows:

Raise vehicle so that the track is off the ground and can turn freely.

⚠ WARNING

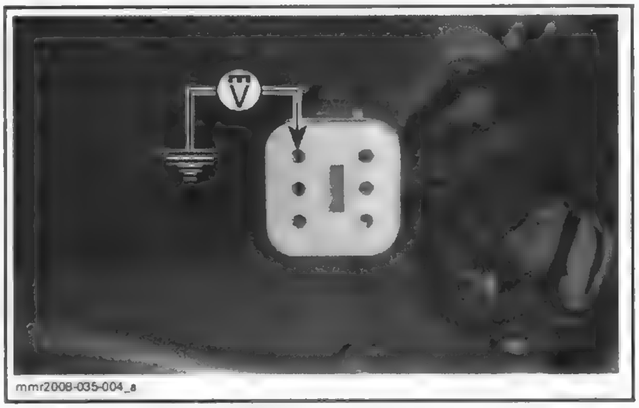
Ensure vehicle track is completely raised off ground. If track should come into contact with ground when engine is at 5000 RPM, equipment damage and severe injury may result.

Set multimeter to Vdc scale.

Disconnect the communication diagnostic connector.

Start engine and read voltage as follows.

TEST ENGINE SPEED	TEST PROBES		VOLTAGE
5000 RPM	Pin 4 (RD/BU wire) (diagnostic connector)	Chassis ground	15.1 Vdc ± 0.5



TYPICAL

If voltage is above specification, replace voltage regulator.

If voltage is below specification, check stator and wiring/connections. If good, try a new voltage regulator.

500SS/800R Electric Start and 600 HO SDI Manual Start

Proceed as follows:

Raise vehicle so that the track is off the ground and can turn freely.

⚠ WARNING

Ensure vehicle track is completely raised off ground. If track should come into contact with ground when engine is at 5000 RPM, equipment damage and severe injury may result.

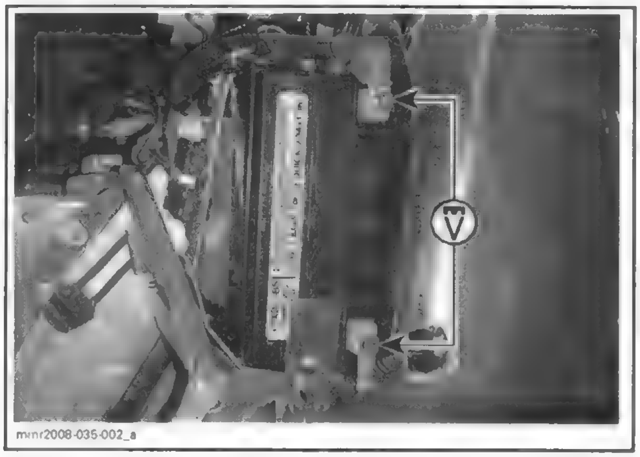
Remove RED rubber boot protector from positive battery post.

Set multimeter to Vdc scale.

Connect multimeter to battery posts.

Start engine and read voltage as follows.

TEST ENGINE SPEED	TEST PROBES		VOLTAGE
5000 RPM	Battery (+)	Battery (-)	15.1 Vdc ± 0.5



TYPICAL

If voltage is above specification, replace voltage regulator.

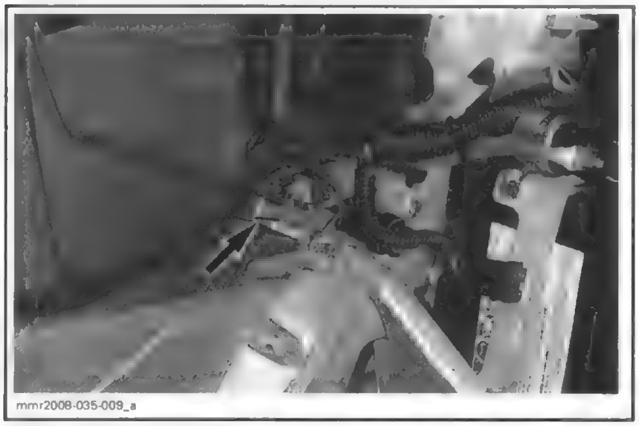
If voltage is below specification, check stator and wiring/connections.

Voltage Regulator Removal

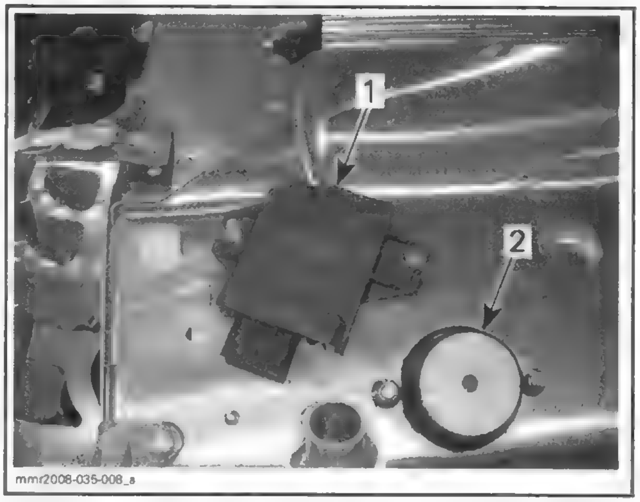
500SS/800R

Disconnect battery (if so equipped).

The voltage regulator is located on the right side of the frame just ahead of the fuel tank, and under the oil tank.



VOLTAGE REGULATOR



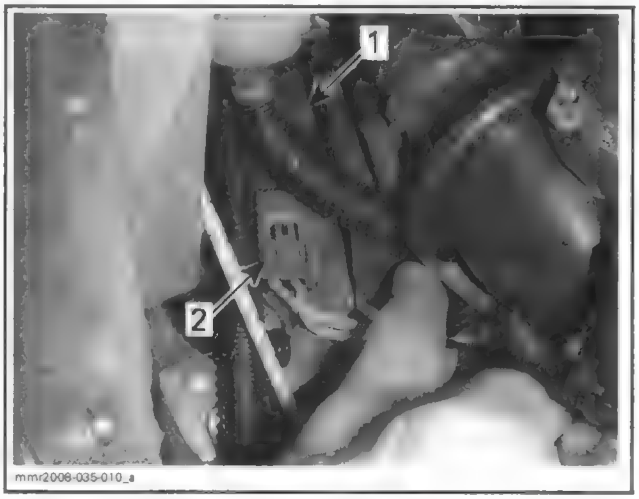
TYPICAL
1. Voltage regulator
2. RH rear engine mount

Remove the primary air intake silencer.

Disconnect the carburetors from the intake adapters.

Move fuel tank back, refer to *FUEL TANK/FUEL PUMP* section.

Disconnect the voltage regulator connector.



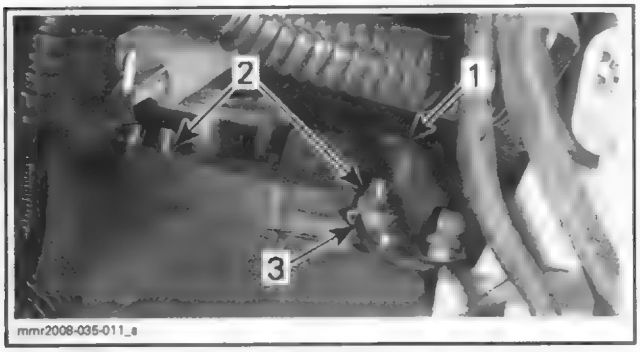
1. Voltage regulator
2. Voltage regulator connector

NOTE: The regulator connector can be accessed from the front right side, by removing the muffler and the accoustic panel.

Loosen the RH elastic nut.

Remove the LH elastic nut, star washer and flat washer.

NOTE: Note the position of the grounding wire, star washers and flat washers for installation.



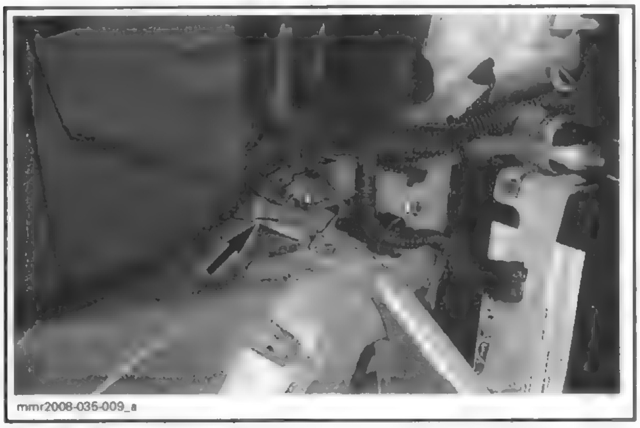
1. *Voltage regulator connector*
2. *Regulator mounting studs*
3. *Electrical harness grounding wire*

Remove the regulator from its mounting studs.

600 HO SDI

Disconnect battery.

The voltage regulator is located on the right side of the frame just ahead of the fuel tank, and under the oil tank.



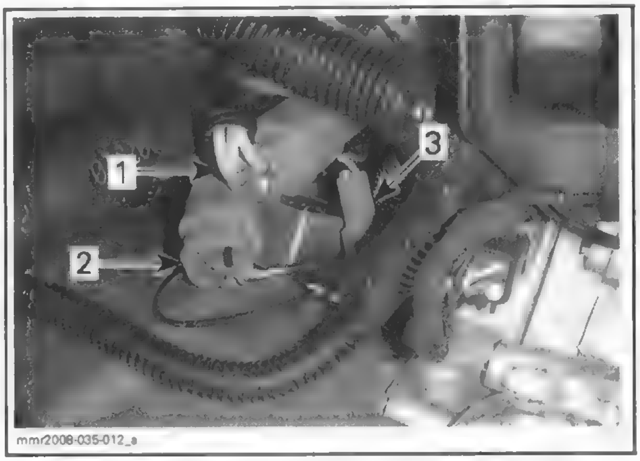
VOLTAGE REGULATOR

Remove the primary air intake silencer.

Disconnect the throttle body assembly from the intake adapters.

Move fuel tank back, refer to *FUEL TANK/FUEL PUMP* section.

Disconnect the voltage regulator connectors.



1. *Stator connector (MO)*
2. *Regulator connector (RE)*
3. *Regulator connector (MA)*

Loosen the RH elastic nut.

NOTE: Note the position of the grounding wires, star washers and flat washers (one ground on each stud).

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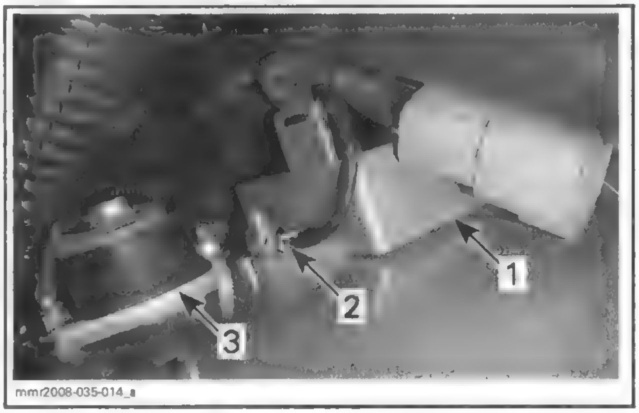
ELECTRICAL HARNESS GROUND WIRE, RH MOUNTING STUD

Remove the LH elastic nut, grounding wire, star washer and flat washer.



1. *Voltage regulator*
2. *Regulator grounding wire, LH mounting stud*
3. *RH rear engine mount*

Remove the regulator from its mounting studs.

Voltage Regulator Installation

Insert the right flange of the regulator on its mounting stud, under the elastic nut, grounding wire and washers.

NOTE: Make sure all the hardware is positioned over the regulator flange. On **600 HO SDI models**, connectors face rearward. All other models, connector faces forward.

Insert the LH side of the regulator on its mounting stud.

Install mounting stud hardware.

NOTE: Make sure the ground lug(s) and mounting hardware are positioned over the regulator flange as per disassembly. Be careful not to twist or break the wires and ground lugs when tightening each elastic nuts.

Complete the installation in the reverse order of the removal procedure.

Torque voltage regulator screws to 5 N•m (44 lbf•**in**).

STATOR

Stator Continuity Test

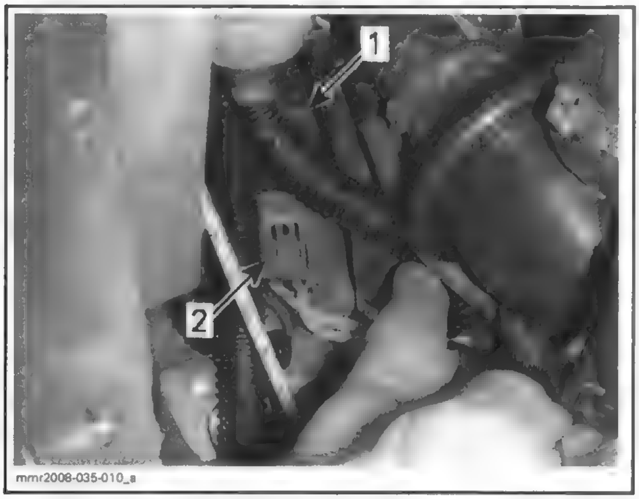
500SS/800R

Remove RH side panel.

Remove muffler.

Remove accoustic panel.

Disconnect connector from voltage regulator.

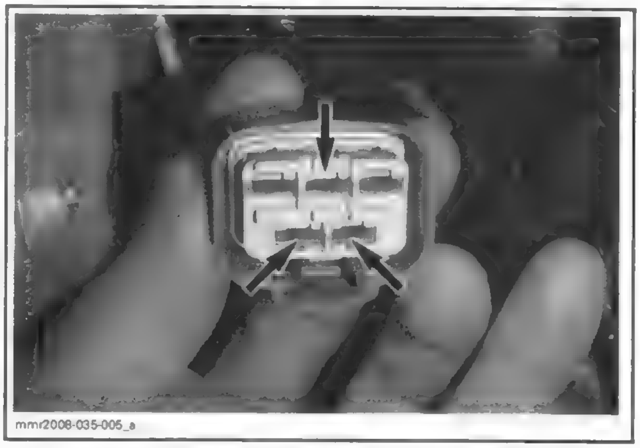


1. Voltage regulator
2. Regulator connector

Set multimeter to Ω.

Read the resistance between wires as follows.

TEST PROBES		RESISTANCE @ 20°C (69°F)
Any YELLOW wire	To another YELLOW wire	0 - 0.5 Ω



VOLTAGE REGULATOR CONNECTOR, YELLOW WIRES

Repeat test for every pair of YELLOW wires.

If resistance is out of specification, replace stator.

Install the connector and other parts in the reverse order of removal. Refer to appropriate sections for details.

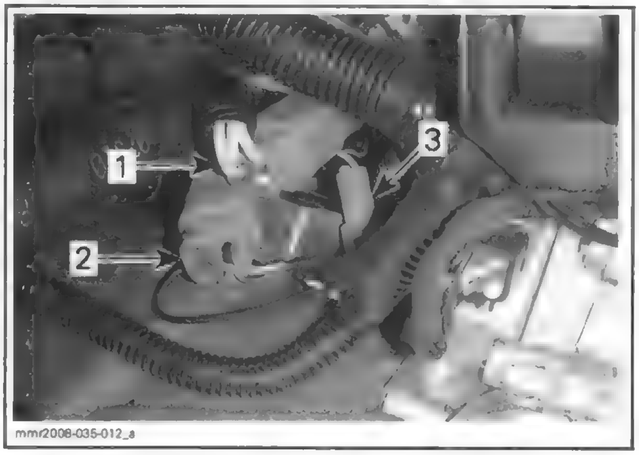
600 HO SDI

Remove the primary air intake silencer.

Disconnect the throttle body assembly from the intake adapters.

Move fuel tank back, refer to *FUEL TANK/FUEL PUMP* section.

Remove the voltage regulator stator connector.

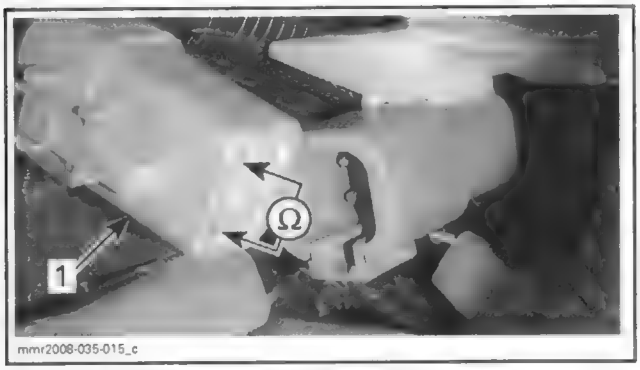


1. Stator connector (MO)
2. Regulator connector (RE)
3. Regulator connector (MA)

Set multimeter to Ω.

Read the resistance as follows.

TEST PROBES		RESISTANCE @ 20°C (69°F)
Any YELLOW wire	To another YELLOW	0 - 0.5 Ω



VOLTAGE REGULATOR CONNECTOR
1. Magneto stator connector

Repeat test for every pair of YELLOW wires.

If resistance is out of specification, replace stator.

Install the connector and other parts in the reverse order of removal. Refer to appropriate sections for details.

Stator Insulation Test

Refer to the applicable *STATOR CONTINUITY TEST* for instructions on how to access stator connector on voltage regulator.

Set multimeter to Ω.

Read resistance as follows.

TEST PROBES		RESISTANCE @ 20°C (69°F)
Any YELLOW wire	Engine ground	0L (open circuit)

If results are out of specification, the stator and/or the wiring need to be repaired/replaced.

Stator AC Voltage Output Test

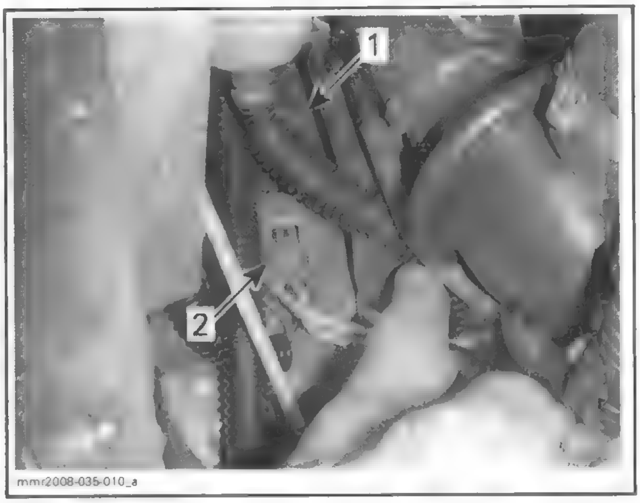
500SS/800R

Remove RH side panel.

Remove muffler.

Remove accoustic panel.

Disconnect the voltage regulator connector.

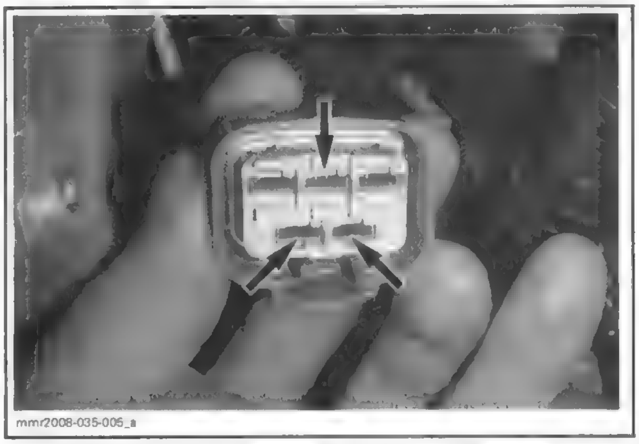


1. Voltage regulator
2. Regulator connector

Set multimeter to Vac scale.

Manually crank engine and read the voltage as follows. Repeat the test 3 times for each pair of YELLOW wires.

TEST PROBES		VOLTAGE
Any YELLOW wire	Any other YELLOW wire	3.5 - 7.5 Vac



VOLTAGE REGULATOR CONNECTOR, YELLOW WIRES

If voltage is lower than specification, replace stator.

Install all removed parts.

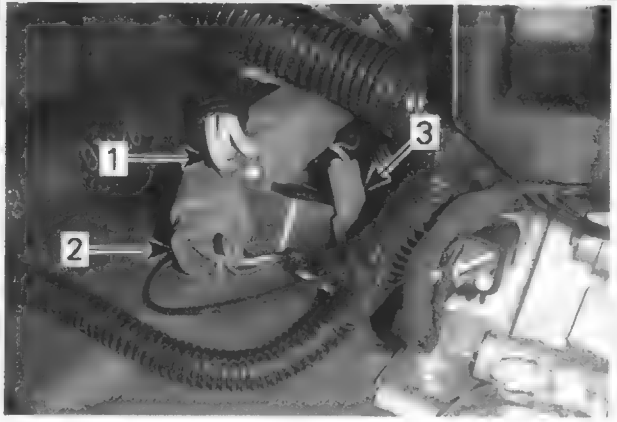
600 HO SDI

Remove the primary air intake silencer.

Disconnect the throttle body assembly from the intake adapters.

Move fuel tank back, refer to *FUEL TANK/FUEL PUMP* section.

Disconnect the stator connector from the voltage regulator.



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1. *Stator connector (MO)*
2. *Regulator connector (RE)*
3. *Regulator connector (MA)*

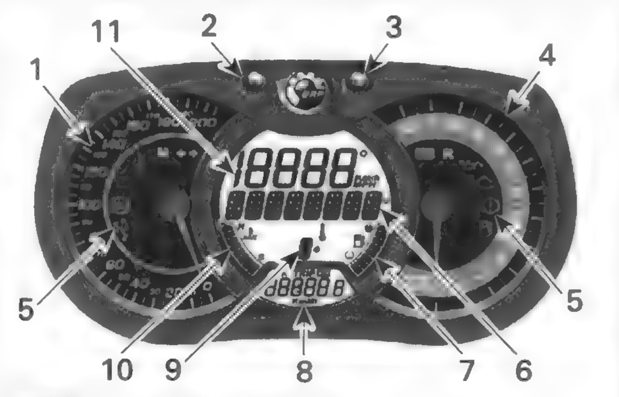
Set multimeter to Vac.

NOTE: To facilitate taking the voltage readings, use the 4-pin magneto diagnostic harness (P/N 529036021). Connect only the magneto side for this test.

mmr2008-035-016

Manually crank engine and read the voltage as follows. Repeat the test 3 times for each pair of YELLOW wires.

TEST PROBES		VOLTAGE
Each YELLOW wire	Any other YELLOW wire	3.5 - 7.5 Vac



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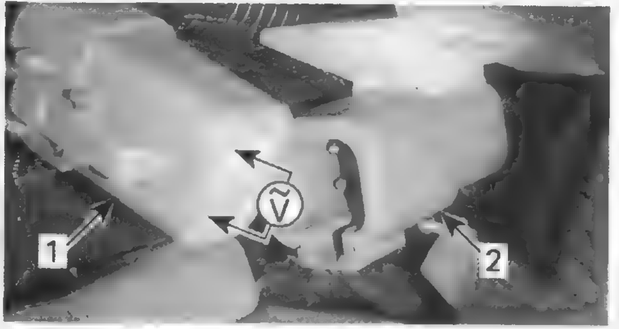

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STATOR VOLTAGE OUTPUT TEST
1. *Voltage regulator connector*
2. *Stator connector*

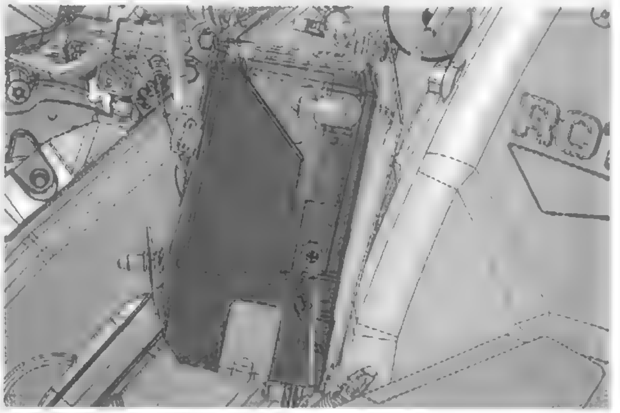
If voltage is lower than specification, replace stator.

Install the connector and other parts in the reverse order of removal. Refer to appropriate sections for details.

BATTERY (YT4L-BS)

600 HO SDI Manual Start

These models are equipped with a YT4L-BS type battery that requires a specific charging procedure at predelivery.



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YT4L-BS BATTERY WITH ADAPTER

Battery Charge Testing

⚠ WARNING

Always wear safety glasses and charge in a ventilated area. Never charge or boost battery while installed on vehicle. Never open the sealed caps. Do not place battery near open flame.

These sealed batteries have to be tested with a voltmeter.

Batteries with a voltage of 12.8 volts and above, no charge is required.

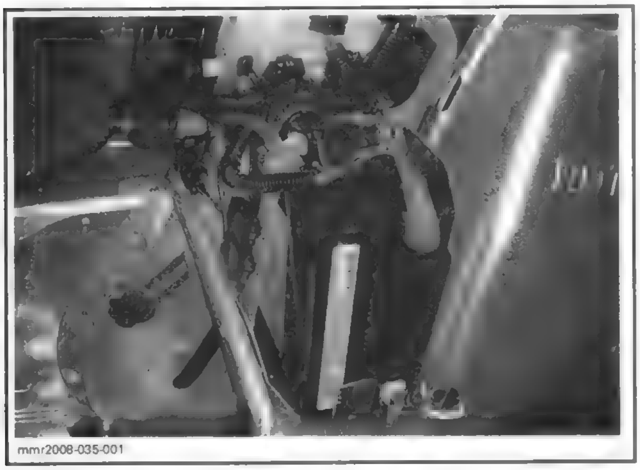
Batteries with a voltage of 12.7 volts and below must be charged as follows:

BATTERY TYPE	STANDARD CHARGE	QUICK CHARGE
YT4L-BS	0.3 amps/hour for 5 to 10 hours	3.0 amps/hour for 30 min.

BATTERY (YTX20L-BS)

500SS/800R/600 HO SDI (Electric Start)

These models are equipped with a sealed valve regulated lead acid (VRLA) battery. They are non-spillable and maintenance reduced (no electrolyte level to be checked and readjusted). No ventilation tube is attached to the battery.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TYPICAL

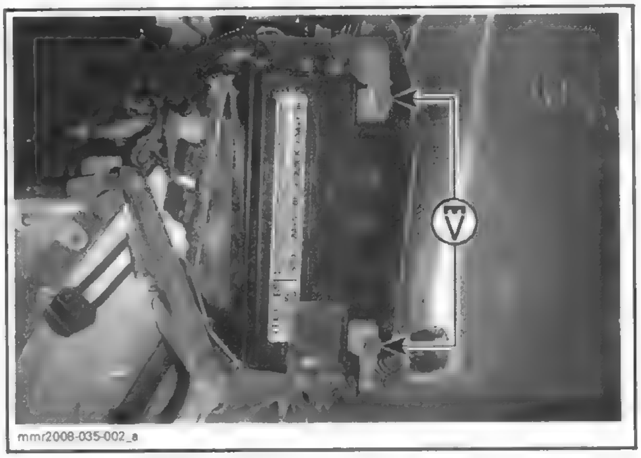
Battery Charge Unloaded Test

Unloaded Voltmeter Test

NOTE: An unloaded test is carried out on a battery without discharging current. It is the simplest and most commonly used. However, be aware that a voltage test can indicate that the battery is in good condition even though the battery does not have enough power to crank the engine. A voltage reading provides an instant indication of the state of charge of the battery, not of it's current storage capacity. A battery load test gives a more accurate indication of the battery condition.

If the battery has just received a charge, allow it to rest for 1–2 hours before taking a voltage reading.

Set multimeter to Vdc and connect to battery terminals. Always respect polarity.



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Batteries with a voltage above 12.8 V do not need to be charged.

Batteries with a voltage of 12.8 V and below need to be charged. Refer to *BATTERY CHARGING* in this section.

Battery Load Test

This is the best test to determine the battery condition. Use a load testing device such as the NAPA ULTRA PRO battery load tester (P/N 95260). It has a 500 Amp carbon pile adjustable load.

Battery should be fully charged.

If battery has just been recharged, allow battery to rest for at least one hour.

Follow battery load tester instructions.

If battery voltage has dropped below 10 Vdc (or voltage indicated on battery temperature compensation chart), battery storage capacity has decreased appreciably and should be replaced.

Battery Removal

⚠ WARNING

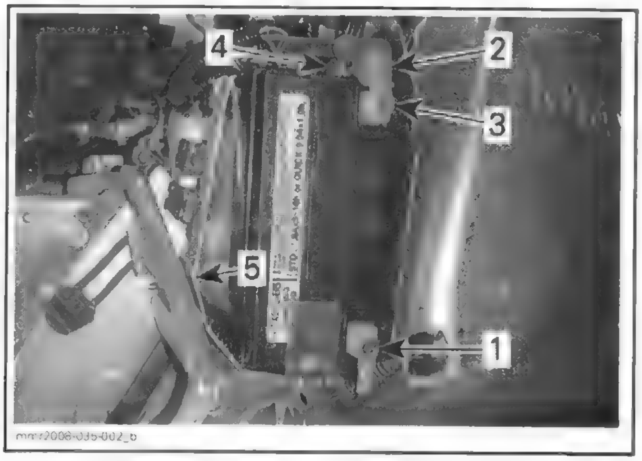
Battery BLACK (–) cable must always be disconnected first and connected last. Never charge or boost battery while installed on vehicle.

500SS/800R

Open right side panel of vehicle.

Disconnect BLACK (–) cable end from the terminal.

Slide off rubber boot from RED (+) cable and disconnect it.

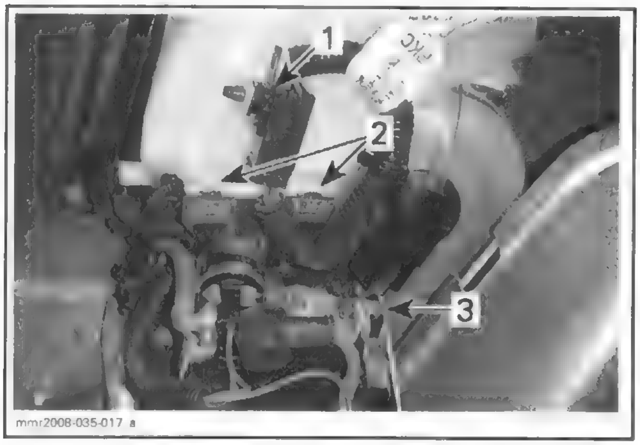


1. *Negative post (-)*
2. *Rubber boot*
3. *Positive terminal (+)*
4. *Battery retaining bolt and nut*
5. *Retaining strip hook*

Remove electrical harness from retaining clip.

Unclip both fuses from oil tank.

Remove the battery retaining strip nut and bolt.



1. *Harness retaining clip*
2. *Fuse holder retaining clips*
3. *Battery retaining strip bolt*

Lift the retaining strip and unhook it from the battery support to remove it.

Move retaining strip aside.

Remove battery.

CAUTION: Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water to prevent damage to vehicle components.

600 HO SDI

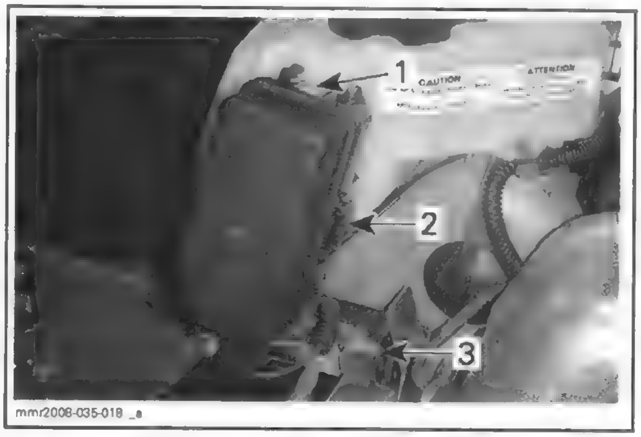
Open right side panel of vehicle.

Disconnect BLACK (–) cable end from the terminal.

Slide off rubber boot from RED (+) cable and disconnect it.

Remove fuse box from its holder on oil tank by lifting the locking tab with a small screwdriver and pulling it off its holder.

Unscrew the battery retaining strip nut.



1. *Locking tab*
2. *Battery holder slides*
3. *Battery retaining strip bolt*

Move retaining strip and fuse box aside.

Remove battery.

CAUTION: Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water to prevent damage to vehicle components.

Battery Cleaning

Clean the battery, battery casing, cables and battery posts using a solution of baking soda and water.

Remove corrosion from battery cable terminals and battery posts using a firm wire brush. Battery top should be cleaned with a soft brush and any grease-cutting soap or baking soda solution.

Battery Inspection

Visually inspect battery casing for cracks, leaks or other possible damage. Discoloration, warping or raised top, indicates that battery has overheated or been overcharged. If casing is damaged, replace battery and thoroughly clean battery tray and surrounding area with a water and baking soda.

⚠ WARNING

Should the battery casing be damaged, wear a suitable pair of non-absorbent gloves when removing the battery by hand.

Inspect battery posts for security of mounting.

Battery Storage

CAUTION: A discharged battery will freeze and it may damage its casing. A damaged casing will allow electrolyte spillage that may damage surrounding parts.

Disconnect and remove battery from the vehicle.

The battery must always be stored in fully a charged condition.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of silicone dielectric grease (P/N 293 550 004) or petroleum jelly on terminals.

Clean battery casing using a solution of baking soda and water. Rinse battery with clear water and dry thoroughly using a clean cloth.

Charge the battery every month if stored at a temperature **below** 15°C (60°F).

Charge the battery every two week if stored at a temperature **above** 15°C (60°F).

New Battery Activation

Refer to the instructions provided with the battery.

Battery Charging

⚠ WARNING

Always wear safety glasses and charge in a ventilated area. Never charge or boost battery while installed on vehicle. Do not open the sealed caps during charging. Do not place battery near open flame.

CAUTION: If battery becomes hot, stop charging and allow it to cool before continuing.

NOTE: Sealed VRLA batteries have an internal safety valve. If battery pressure increases due to overcharging, the valve opens to release excess pressure, preventing battery damage.

Perform *BATTERY CHARGE TESTING* above then proceed as described here.

An automatic charger is the fastest and most convenient way for error-proof charging.

When using a constant current charger, charge battery according to the chart below.

Battery Voltage Below 12.8 V and Above 11.5 V

STANDARD CHARGING (RECOMMENDED)		
BATTERY TYPE	TIME	CHARGE
YTX20L-BS	4-9 hours	2 A

QUICK CHARGING		
BATTERY TYPE	TIME	CHARGE
YTX20L-BS	50 minutes	10 A

Battery Voltage Below 11.5 V

Batteries with voltage below 11.5 V requires special procedures to recharge. In charging an over discharged battery, its internal resistance may be too high to charge at a normal charging voltage.

Set charger to 10 A charging rate and monitor charging current for approximately 30 minutes. If there is no change in charging currentor battery becomes abnormally hot, the battery is most likely at the end of its service life and should be replaced.

Battery Installation

Reinstall battery and secure retaining strip to support properly.

Install fuse box, fuse holders and harness as applicable to model.

Connect RED (+) cable it to positive battery terminal. Connect RED wire (coming from 30 A fuse).

Connect BLACK (–) cable LAST.

⚠ WARNING

Battery BLACK (–) cable must always be disconnected first and connected last. Never charge or boost battery while installed on vehicle.

Cover the RED (+) terminal with rubber boot.

Apply silicone dielectric grease (P/N 293 550 004) on battery posts and connectors.

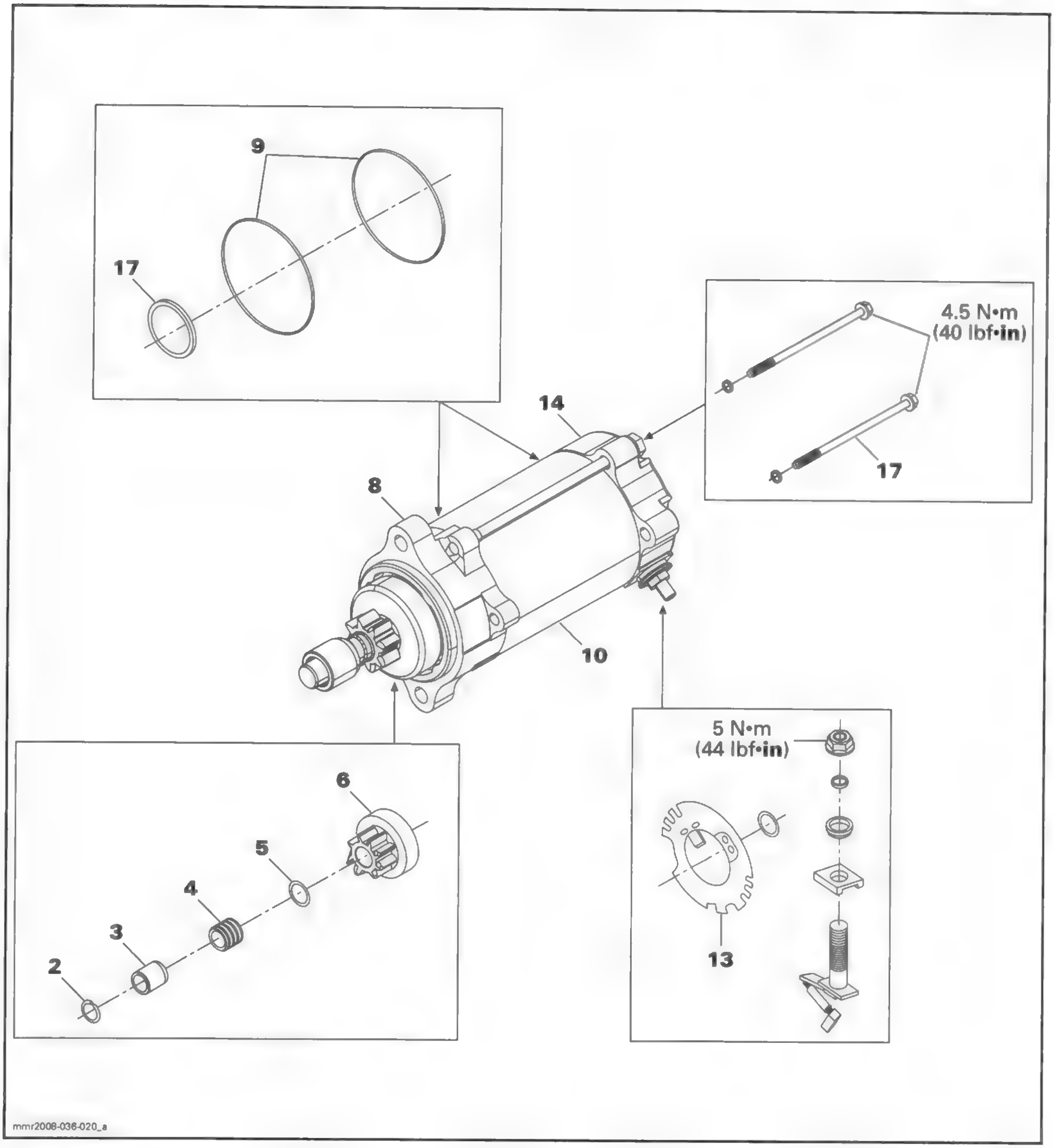
STARTING SYSTEM

SERVICE TOOLS

Description	Part Number	Page
ECM adapter	420 277 010	316
Fluke 111 multimeter	529 035 868	311

SERVICE PRODUCTS

Description	Part Number	Page
ThermoLube synthetic grease	219 700 417	320, 322


4.5 N•m
(40 lbf•in)
5 N•m
(44 lbf•in)
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GENERAL

This section covers only electric start models.

NOTE: On applicable models, it is good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to *MONITORING SYSTEM/FAULT CODES*.

For best results, use the Fluke 111 multimeter (P/N 529 035 868).

In case of problems, first ensure the problem is not related to engine mechanical components. If not, test the starting system.

Basic Starting System Operation

When the START button is pressed, a signal is sent to the ECM which completes the starter solenoid circuit. The battery then supplies current to the starter through the starter solenoid to crank the engine.

Conditions for Engine Cranking

- RUN/STOP switch to RUN
- DESS cap installed
- Press START button.

TROUBLESHOOTING

Starter Will Not Crank Engine

If the engine starter will not crank the engine, try a pull start to see if the engine can be started.

If the engine cannot be started, the problem is not related to the starting system.

If engine can be started (pull START), check the following in this order:

- 30 A fuse (FA)
- 5 A fuse FB (500SS and 800R)
- 7.5 A fuse F4 (600 HO SDI)
- Battery (charge and connections)
- Starter solenoid
- START/RER switch.

PROCEDURES

START/RER FUSE

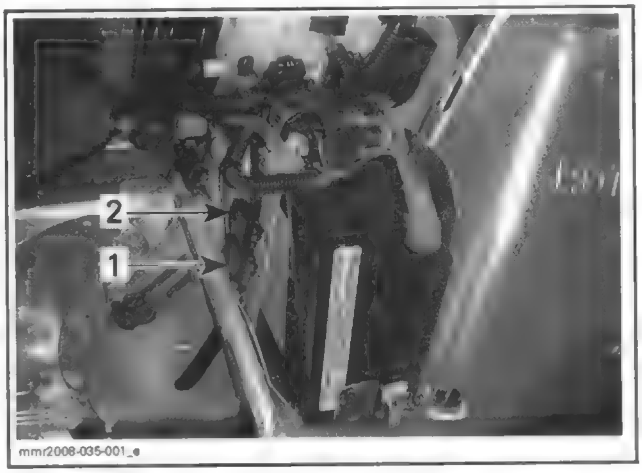
NOTE: When a burnt fuse is found, always identify the cause before replacing it.

Fuse Inspection

500SS/800R

The ECM power circuit used for the starting system passes through the 30 A battery charging fuse (FA).

The starting system is protected with a 5 A rated fuse (FB) on a separate circuit.

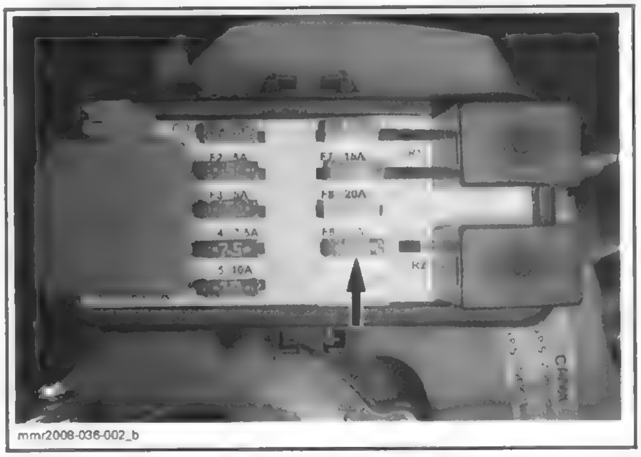


1. Starting fuse
2. Charging fuse

If no voltage is present at ECM or starter does not operate, check each fuse condition and replace it if necessary.

600 HO SDI

On 600 HO SDI, the ECM power circuit used for the starting system is protected with a 5 A fuse (F9) located in the fuse box. If no voltage is present at ECM or starter does not function, check fuse condition and replace it if necessary.



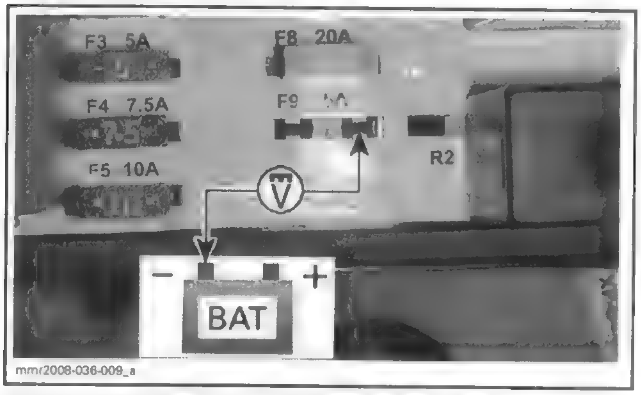
STARTING FUSE F9

Input Voltage Test to Fuse F9

600 HO SDI

Test for battery voltage at fuse contact 8B (VI/RO) supply wire coming from voltage regulator.

MODEL	F9 FUSE	BATTERY	VOLTAGE
600 HO SDI	Pin 8B (VI/RO)	Battery ground	Battery voltage



BATTERY VOLTAGE TEST, CONTACT 8B FUSE F9

If voltage is not adequate, check wire and voltage regulator.

BATTERY

Refer to *CHARGING SYSTEM* to check battery condition.

ENGINE CUT-OUT SWITCH

Refer to *IGNITION SYSTEM.*

START/RER SWITCH

START/RER Switch Quick Test

500SS/800R

There is no quick test for these models.

Proceed with the input voltage test of the START/RER switch.

600 HO SDI

Remove DESS cap from DESS post.

Set RUN/STOP switch to STOP.

Press the START button.

You should obtain the following results:

- Multifunction gauge should come ON, then go off after about 5 seconds.
- The electric fuel pump should function briefly.

If you obtained the above mentioned results, the START/RER switch functions normally.

START/RER Switch Test With B.U.D.S.

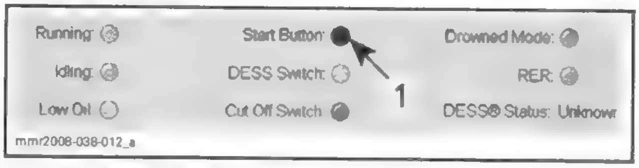
600 HO SDI

Use the latest B.U.D.S. software available from BOSSWeb. Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* for proper connection instructions.

A quick operational test can be carried out using the **Monitoring** section in B.U.D.S.

Set engine cut-off to ON and install DESS cap on DESS post.

Press the START/RER button and look at the **Start Button** LED in B.U.D.S.



1. *Should turn on (green)*

- If the LED turns on, the starting system is functional on the input side of the starting system (START/RER button and ECM). Test the output side of the starting system (ECM output signal to starter solenoid, solenoid and starter.
- If the LED does not turn on, test the input side (START/RER button).

Input Voltage Test (START/RER Switch)

500SS/800R

Remove multifunction gauge. Refer to *BODY* section.

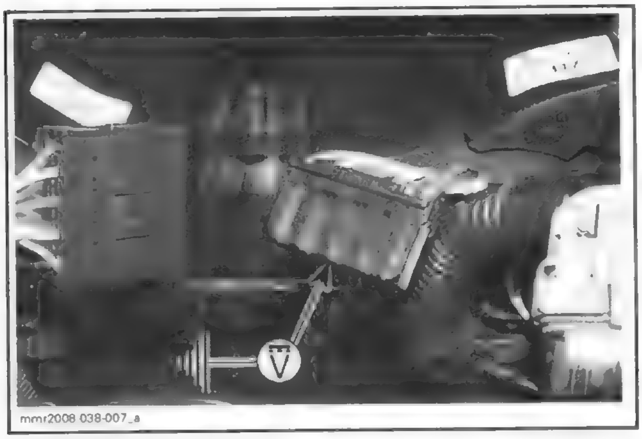
Disconnect the 13-pin connector on the steering harness.

Set multimeter to Vdc.

Measure voltage at battery terminals. It should be approximately 12.8 Vdc for a fully charged battery.

Measure the input voltage on the vehicle harness side of connector as follows.

VEHICLE CONNECTOR 5-HG		VOLTAGE
Pin 5 (RD/GY)	Battery ground	Battery voltage



13-PIN CONNECTOR 5-HG

If you do not obtain battery voltage, check the following:

- 30 A battery charging fuse
- 5 A ECM fuse
- START/RER switch circuit continuity.

If voltage is good, carry out a continuity test of the following:

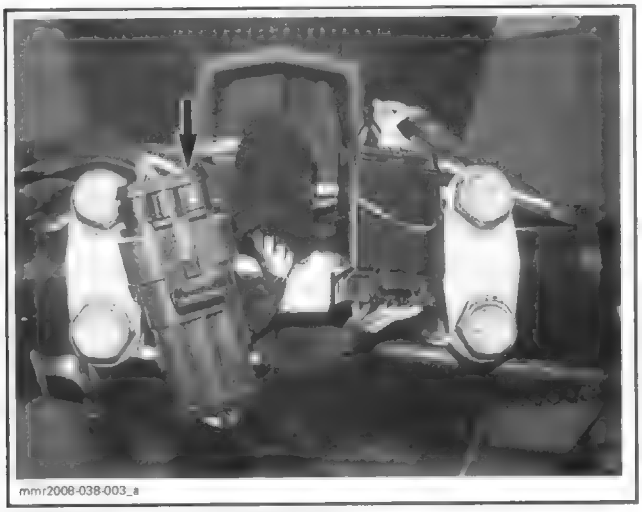
- START/RER switch wiring (steering harness)
- Start control wiring to ECM (vehicle harness)
- ECM ground circuit
- Starter and solenoid circuits.

600 HO SDI

Set multimeter to Vdc.

Measure voltage at battery terminals. It should be approximately 12.8 Vdc for a fully charged battery.

Disconnect the three pin connector on top of the handle bars from the steering harness.



DISCONNECT 3-PIN CONNECTOR

Connect the multimeter between the steering harness pin 3 and battery ground.

MODEL	3-PIN (SB) CONNECTOR	BATTERY	VOLTAGE
600 HO SDI	Pin 3 (RD/BR)	Battery ground	Battery voltage

If battery voltage is obtained, carry out a continuity test of START/RER switch.

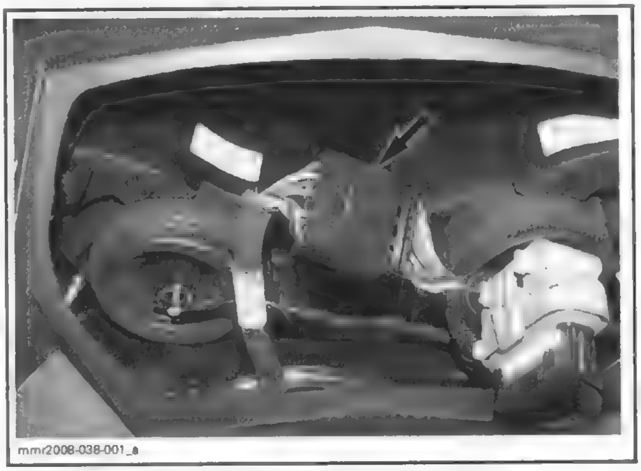
If battery voltage is not obtained, check 5 A fuse (F9), and wiring if required. Refer to *START/RER FUSE* in this section. If good, carry out a continuity test of wire harness from contact 7B of fuse F9 and steering harness 3-pin connector pin 3. Repair or replace wire harness.

Continuity Test (START/RER Switch)

500SS/800R

Remove multifunction gauge. Refer to *BODY* section.

Disconnect the 13-pin connector on the steering harness.

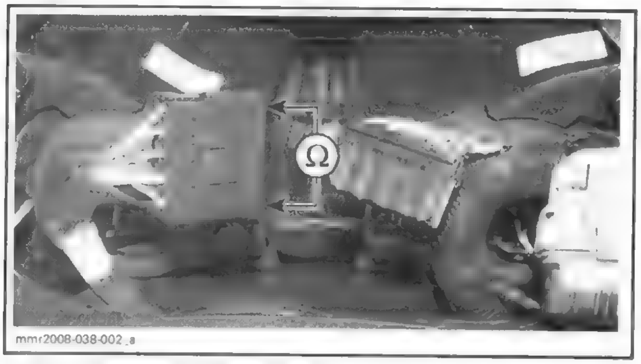


13-PIN CONNECTOR, STEERING HARNESS

Set multimeter to Ω.

Measure continuity of switch and harness wiring as follows.

SWITCH POSITION	13-PIN (HG) CONNECTOR		RESISTANCE
Released	Pin 5 (RD/GY)	Pin 8 (BE)	High value or infinite (0L)
Pressed and held			Continuity (0.2 Ω max.)

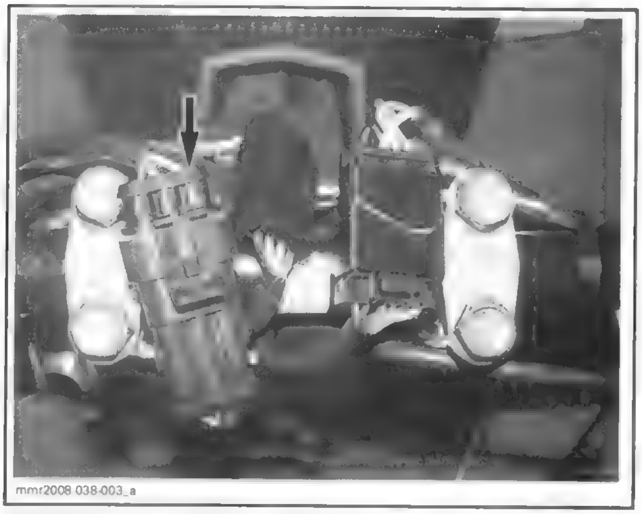


13-PIN STEERING CONNECTOR

If continuity test fails, repair or replace multifunction switch/wiring as applicable.

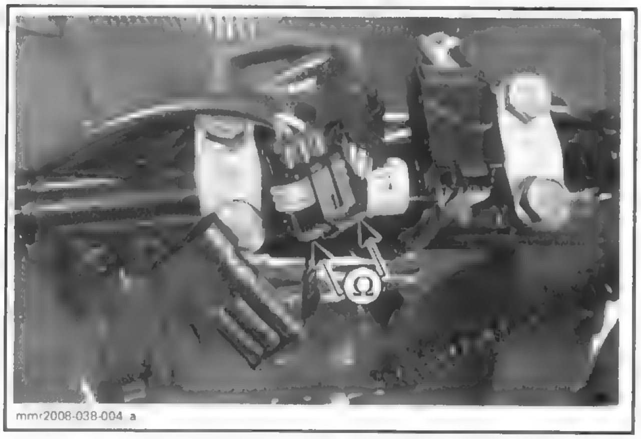
600 HO SDI

Disconnect the switch harness 3-pin connector on top of the handle bars.



DISCONNECT 3-PIN CONNECTOR

Measure switch and harness continuity as follows.

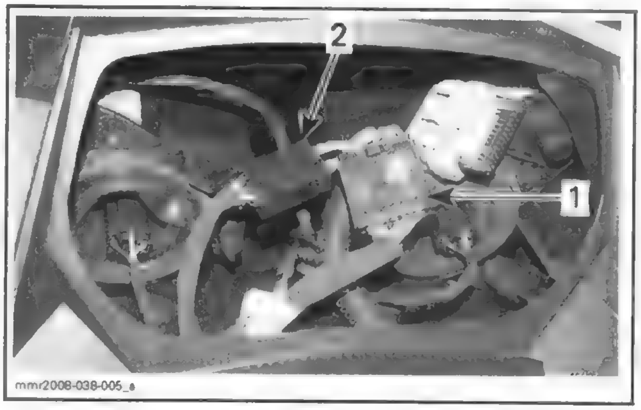


SWITCH POSITION	3-PIN (SB) CONNECTOR		RESISTANCE
Released	Pin 1 (BK)	Pin 2 (RD)	Continuity (0.2 Ω max)
	Pin 1 (BK)	Pin 3 (WH)	High value or infinite (0L)
Pressed and held	Pin 1 (BK)	Pin 2 (RD)	High value or infinite (0L)
	Pin 1 (BK)	Pin 3 (WH)	Continuity (0.2 Ω max)

If continuity test failed, repair or replace multifunction switch/wiring.

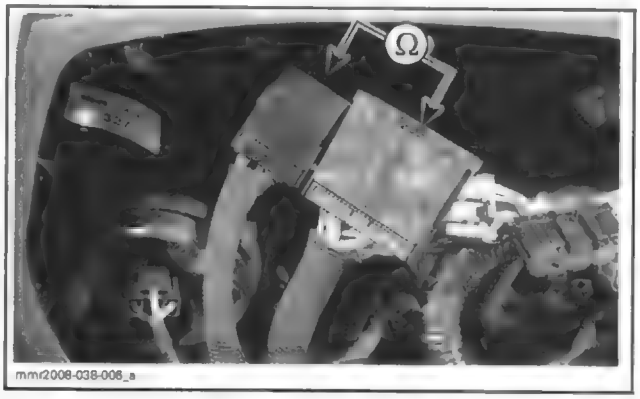
If continuity was good, reconnect 3-pin connector and recheck continuity as follows.

Disconnect steering 11-pin connector and the 8-pin connector under multifunction gauge.



1. *Steering connector (11-pin)*
2. *8-pin connector*

Carry out the following continuity tests.



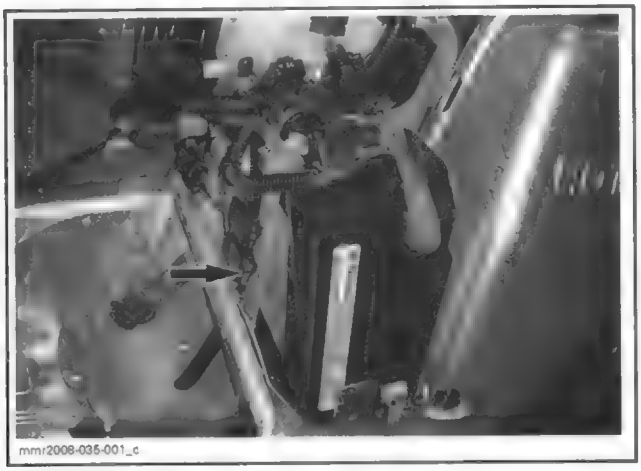
SWITCH POSITION	CONNECTORS		RESISTANCE
	11-PIN (HG)	8-PIN (AC)	
Released	Pin 1 (BK/BU)	Pin 3 (BE)	Continuity (0.2 Ω max.)
	Pin 6 (RD/BR)	Pin 3 (BE)	High value or infinite (0L)
Pressed and held	Pin 1 (BK/BU)	Pin 3 (BE)	High value or infinite (0L)
	Pin 6 (RD/BR)	Pin 3 (BE)	Continuity (0.2 Ω max.)

If continuity readings were not as specified, repair or replace steering harness.

Circuit Continuity Test (START/RER Switch)

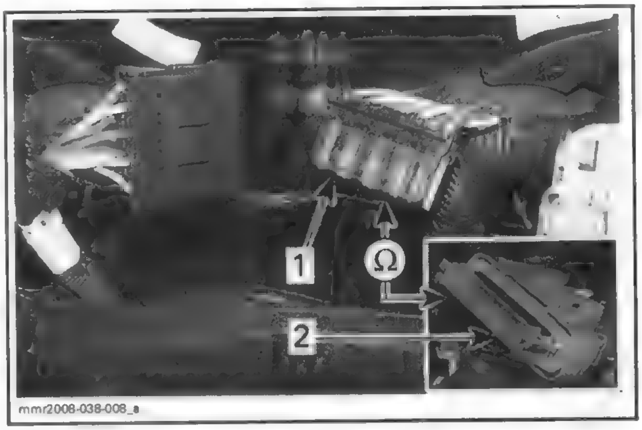
500SS/800R

Disconnect battery or remove 5 A FB fuse (START/RER fuse).



START/RER FUSE

Disconnect ECM connector and steering harness connector.



1. *Steering harness connector*
2. *ECM connector*

Test for continuity as follows.

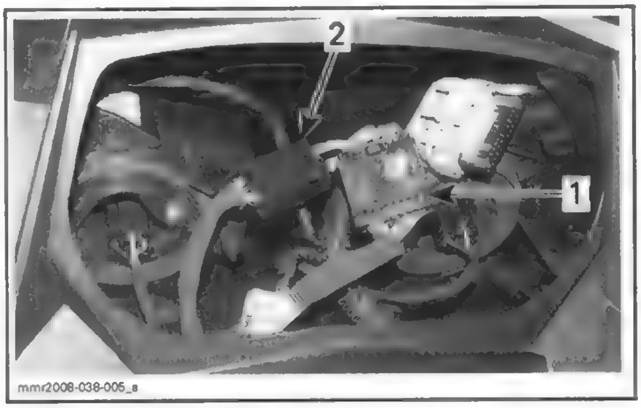
MODEL	CONNECTORS		RESISTANCE
	STEERING (HG)	ECM	
500SS	Pin 8 (RD/GN)	Pin 8 (RD/GN)	Continuity (0.2 Ω max.)
	Pin 5 (RD/GY)	Pin 34 (RD/GY)	
800R	Pin 8 (RD/WH)	Pin 8 (RD/WH)	Continuity (0.2 Ω max.)
	Pin 5 (RD/GY)	Pin 34 (RD/GY)	

If the START/RER switch circuit tests are within specification, test START/RER switch continuity.

600 HO SDI

Remove multifunction gauge.

Disconnect the 11-pin (HG) and 8-pin (AC) steering connectors under the multifunction gauge.

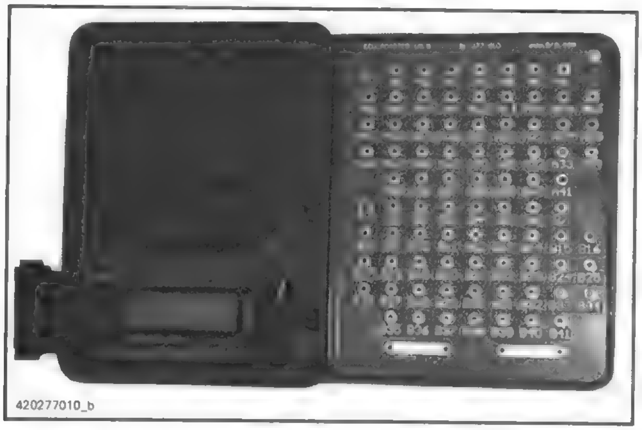


1. *Steering connector (11-pin)*
2. *8-pin connector*

Remove LH side panel, refer to *BODY* section.

Remove tool kit holder and drive belt guard.

Disconnect ECM connector B and install it on the ECM adapter (P/N 420 277 010).


420277010_b

Remove and test fuse F9 and relay 2. Refer to *LIGHTS/GAUGE/ACCESSORIES* section.

Carry out the following continuity test between the 11-pin (HG) and 8-pin (AC) connectors.

CONNECTORS			RESISTANCE
1	(HG) Pin 6 (RD/BR)	Fuse F9 socket Pin 7B (RD/BR)	Close to 0 Ω
2	(AC) Pin 3 (BE)	ECM adapter B Pin 19 (BE)	Close to 0 Ω

If resistance is not within specification, repair or replace wire harness.

Reconnect all connectors and reinstall multifunction gauge.

STARTER SOLENOID

Solenoid Quick Test

Check battery voltage, it should be approximately 12.8 Vdc for a fully charged battery.

Disconnect the small positive connector (RED/GREEN wire) from the solenoid.

Install a jumper wire (with insulated clips) between the positive solenoid terminal and the positive battery terminal.

Disconnect the small negative connector (ORANGE/BLACK wire) on the starter solenoid.

Install a jumper wire on the negative solenoid terminal and momentarily touch the other end to battery ground.

CAUTION: The two small solenoid coil terminals are close to each other. When installing the two jumper wires, make sure the ends of the jumper wires are insulated and cannot come into contact with each other or a short circuit will occur.

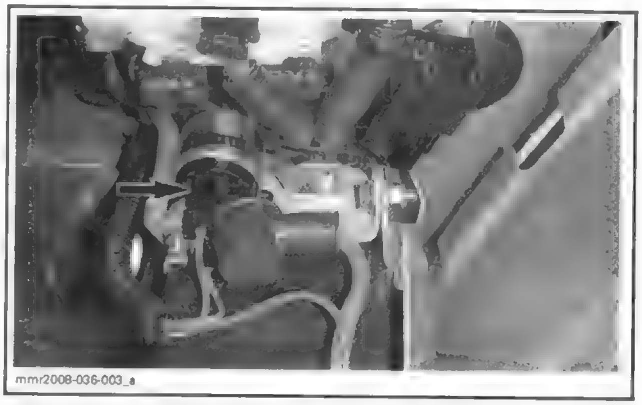
If the starter engages, the solenoid, the starter, and the starter circuits function normally.

If the starter did not engage, carry out the other solenoid tests and starter test if required.

Input Voltage Test (Starter Solenoid)

500SS/800R

Disconnect the connector with the RED/GREEN wire from the solenoid.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DISCONNECT RD/GN WIRE

Install DESS cap on the DESS post.

Set STOP switch to RUN.

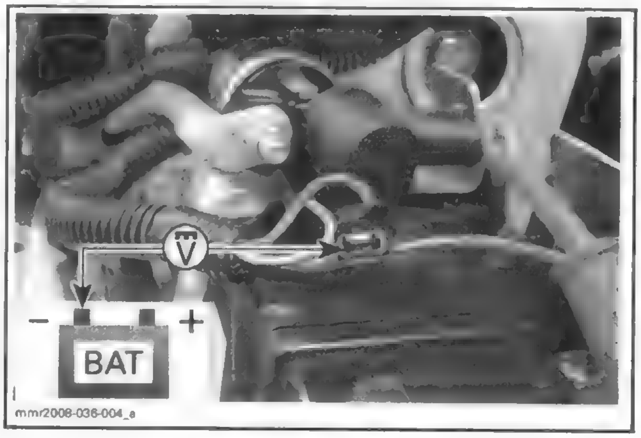
Set multimeter to Vdc.

Test for input voltage to solenoid control winding as follows.

Press and hold the START/RER button as you take the measurement.

Read voltage.

MODEL	SOLENOID CONNECTOR (HARNESS SIDE)	VOLTAGE
500SS, 800R	RED/GREEN with battery ground	Battery voltage



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If voltage is not as specified, refer to *CIRCUIT CONTINUITY TEST (START/RER SWITCH)* in this section.

If the input voltage to the solenoid control winding was as specified, carry out the following test.

Reconnect RED/GREEN terminal to solenoid.

Disconnect ORANGE/BLACK terminal from solenoid (ground signal).

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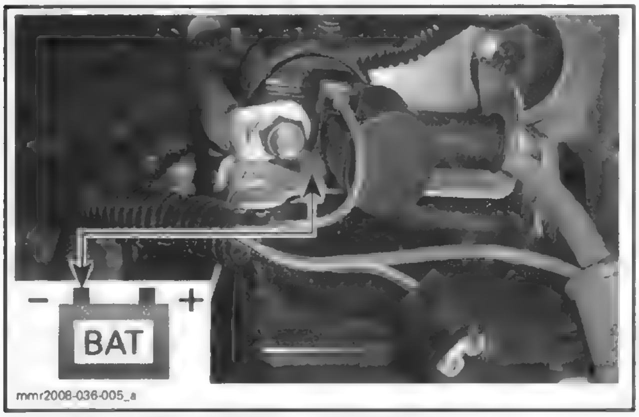
DISCONNECT OR/GN WIRE

Connect a jumper wire between solenoid negative terminal and battery ground.



JUMPER NEGATIVE TO SOLENOID TERMINAL

Press START/RER button.

If solenoid does not function, test solenoid.

If solenoid functions normally, check wiring/connectors for continuity of ORANGE/BLACK wire to connector 3-CF (on front of oil tank), then to ECM connector pin 26.

NOTE: ECM provides ground signal to solenoid control winding through pin 26.

Repair or replace wiring.

Reconnect ORANGE/BLACK wire to solenoid.

600 HO SDI

Remove the DESS cap from the DESS post.

Set the RUN/STOP switch to STOP.

Disconnect the RED/GRAY wire from the starter solenoid.

mmr2008-036-006_b

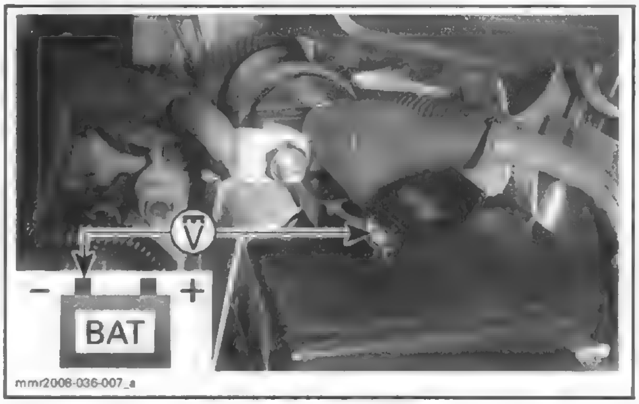
Set multimeter to Vdc and connect to vehicle as per table below.

Press the START/RER button as you take the measurement.

NOTE: The power signal to the solenoid will remain applied for approximately 5 seconds.

Read voltage.

MODEL	SOLENOID CONNECTOR (HARNESS SIDE)	VOLTAGE
600 HO SDI	RED/GREY with battery ground	Battery voltage

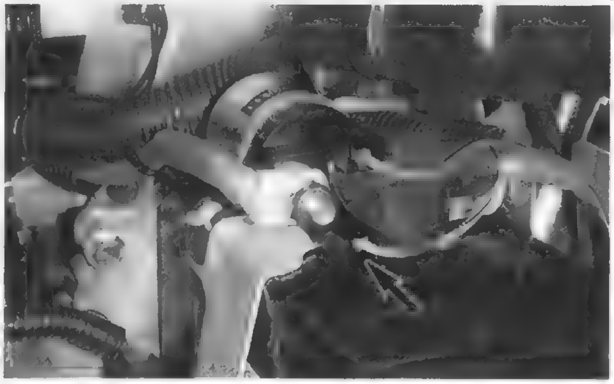


If voltage is not as specified, refer to *CIRCUIT CONTINUITY TEST (START/RER SWITCH)* in this section.

If the input voltage to the solenoid control winding was as specified, carry out the following test.

Reconnect RED/GREY wire to solenoid terminal.

Disconnect ORANGE/BLACK wire from solenoid terminal (ground signal).



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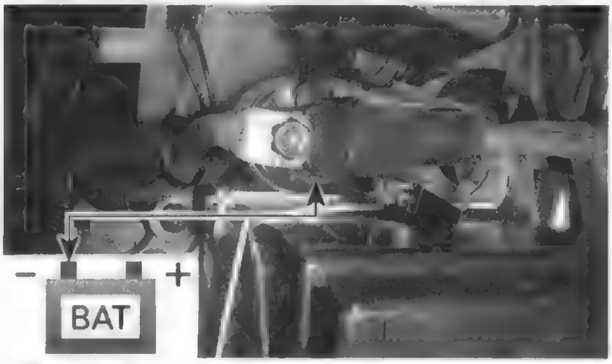
Connect an insulated jumper wire to the solenoid ground terminal.



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As you press the START/RER button, momentarily touch the other end of the jumper to ground, the solenoid should close and engage the starter.

NOTE: The starter should remain engaged for as long as you hold the jumper to ground, and disengage immediately when you remove the ground. The gauge will remain ON for 5 seconds after you remove the ground.

If solenoid does not function, test solenoid.

If the solenoid functioned normally, check wiring/connectors for continuity of ORANGE/BLACK wire to pin 31 of the ECM B connector.

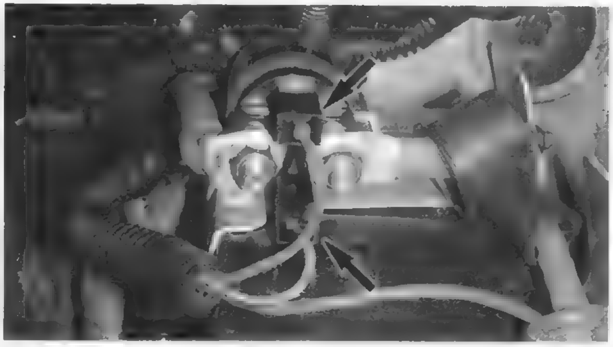
NOTE: ECM provides ground signal required by the solenoid control winding through pin 31 of the ECM B connector.

Repair or replace wiring.

Reconnect ORANGE/BLACK wire to solenoid terminal.

Solenoid Static Test: Continuity

Disconnect the small terminals from the starter solenoid.



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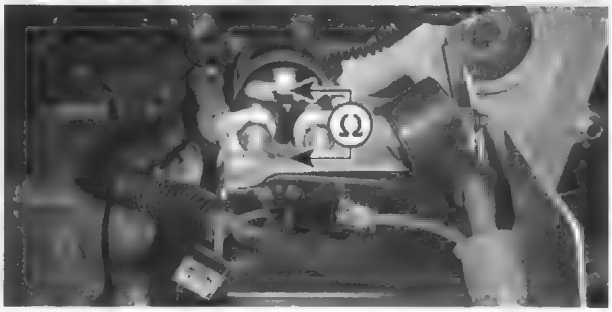
With a multimeter set to Ω, check control winding resistance as follows.

SOLENOID CONNECTOR		MEASUREMENT
TERMINAL		RESISTANCE @ 20°C (68°F)
A	B	Approximately 7.5 Ω



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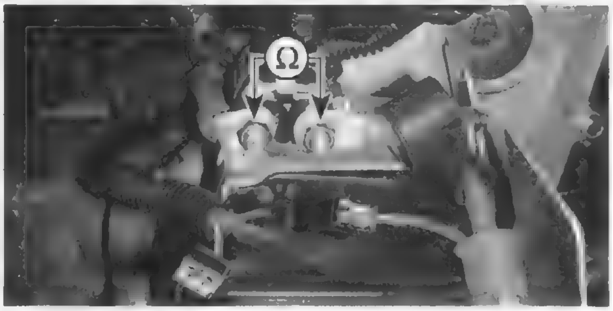
Check for stuck solenoid plunger. Disconnect battery ground cable and measure resistance as follows.

SOLENOID CONNECTOR		MEASUREMENT
Battery post	Starter post	Open circuit



mmr2008-036-013_b

If any measurement is out of specification, replace solenoid.

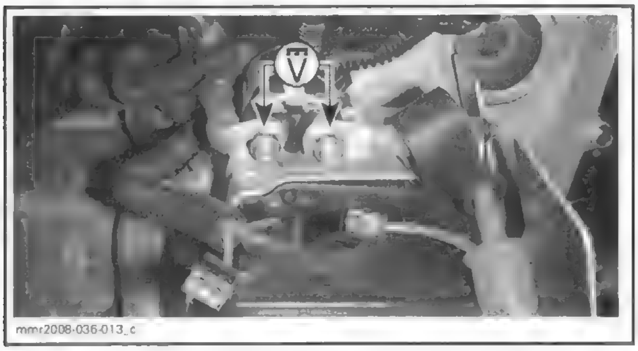
Solenoid Dynamic Test

Reconnect battery ground cable and solenoid connectors.

Disconnect the ignition coil primary winding connector to prevent engine from starting.

Press START/RER button and hold. While engine is cranking, measure the voltage drop as follows.

SOLENOID CONNECTOR		VOLTAGE
Post coming from battery	Post going to starter	0.2 Vdc max.



Reconnect spark plug cables.

If voltage is out of specification, replace solenoid.

If solenoid tests good, check the electric starter.

ELECTRIC STARTER

Starter Test

Either set engine cut-out switch to STOP or remove DESS cap to prevent engine from starting.

Remove the tuned pipe and disconnect spark plug cables.

⚠ WARNING

Do not touch spark plug or cables when cranking engine. High voltage would cause a powerful electrical shock if you touch them.

Using booster cable, carefully supply current from the battery directly to the starter. Connect the BLACK cable first. Connect the remaining booster cable from the battery then to the starter.

If the starter does not turn, check for mechanical problem in the starter.

Starter Removal

Remove both side panels and hood, refer to *BODY* section.

Disconnect BLACK (-) cable from battery.

Disconnect RED (+) cable from battery.

⚠ WARNING

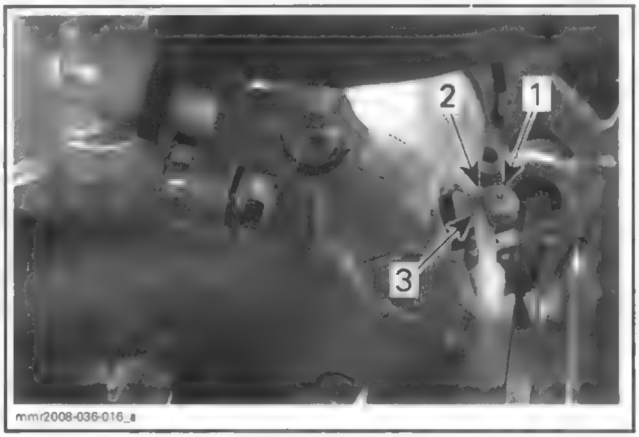
Always disconnect BLACK (-) cable first and connect last.

Remove tool kit holder and drive belt guard.

Remove drive belt and drive pulley, refer to *ENGINE DRIVE SYSTEM* section.

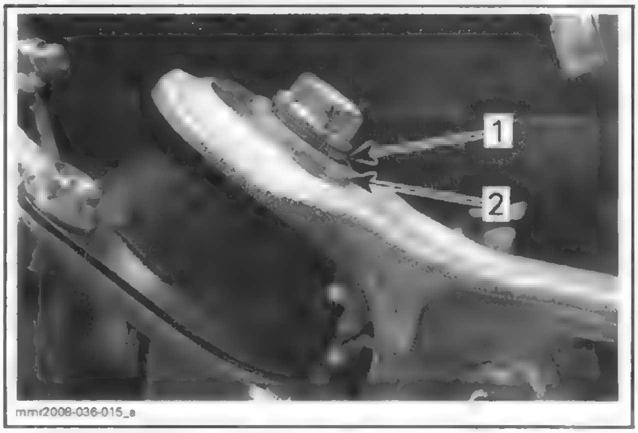
Remove muffler and tuned pipe, refer to *EXHAUST SYSTEM* section.

Disconnect RED cable from starter.



STARTER POWER CABLE
1. *Elastic nut*
2. *Washer*
3. *Power cable*

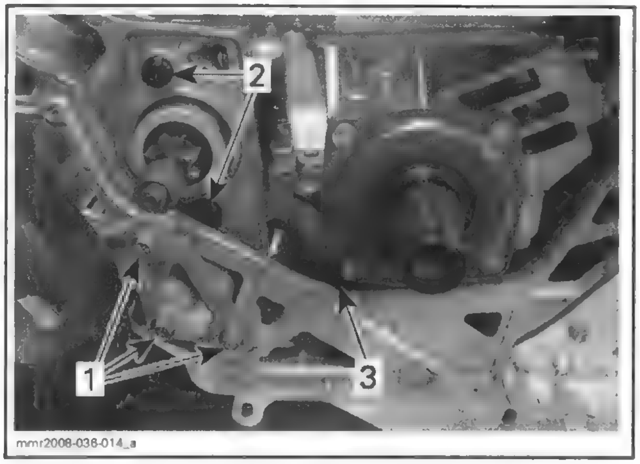
Remove the LH front and rear engine mounting hex screws (PTO side). Discard the screws.



LH FRONT ENGINE MOUNT
1. *Conical washer*
2. *Flat washer*

NOTE: Pay attention to the washer positions for installation. The front mount screw has a conical spring washer under the head of the screw followed by a flat washer.

Remove and discard the three bolts retaining the engine torque stopper support.



1. *Screws, torque stopper support*
2. *Starter screws*
3. *Pry bar position*

Insert a pry bar over the LH frame member and gently raise the engine just enough to access the lower mounting torx screw on the starter.

Remove and discard the lower mounting screw from the starter.

Remove the pry bar.

Remove and discard the upper mounting screw from the starter, discard screw.

Remove and discard the RH starter mounting screw from the front of the engine.

2
1
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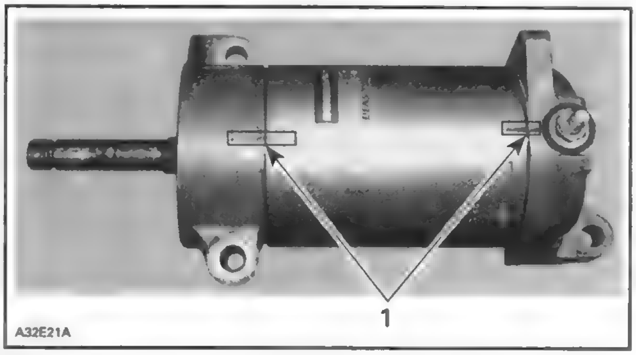
STARTER MOUNTING SCREW, RH
1. *Washer under screw head*
2. *Washer spacer between starter and engine*

NOTE: Pay attention to the spacer between engine and starter, and the washer under the screw head when removing the mounting screw on the RH side of the starter.

Starter Disassembly

Refer to the exploded view in the beginning of this section.

Before disassembling, trace index marks on starter housing **no. 10** and starter housing assembly **no. 8** and **no. 14** to ease assembly.



TYPICAL
1. *Alignment index marks for assembly*

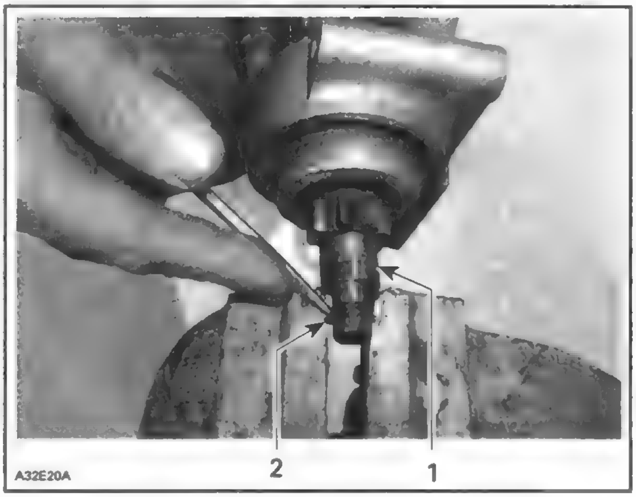
Remove starter through bolts **no. 17**. Separate end frame housing **no. 14** from starter housing **no. 10**. Withdraw starter housing from armature.

Brush holder **no. 13** can be removed from end frame housing **no. 14** by disconnecting the end frame attached brush from brush holder **no. 13**.

Check the radial play between the armature shaft and end frame bearing. Replace the end frame bearing or replace starter. If parts are in good condition then coat with ThermoLube synthetic grease (P/N 219 700 417) before reinstalling them.

Push back the collar **no. 3** using a screwdriver.

Remove snap ring **no. 2**. Remove collar **no. 3** and spring **no. 4**.



1. *Collar*
2. *Snap ring*

Turn starter clutch **no. 6** clockwise to remove it from armature assembly.

Pull housing from armature.

Starter Cleaning

CAUTION: Yoke assembly and drive unit assembly must not be immersed in cleaning solvent.

Clean brushes and holders with a clean cloth soaked in solvent. Brushes must be dried thoroughly with a clean cloth.

Blow brush holders clean using compressed air.

⚠ WARNING

Always wear safety glasses when using compressed air.

Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean and dry cloth.

Clean engine ring gear teeth and drive unit (clutch).

NOTE: Bushings or bearings must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean and dry cloth.

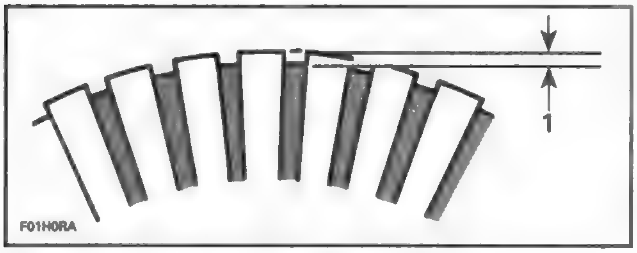
Starter Inspection

Armature

NOTE: An ohmmeter may be used for the following testing procedures, except for the one concerning the shorted windings in the armature.

Check the commutator for roughness, burnt or scored surface. If necessary, turn the commutator on a lathe, enough to remove grime only.

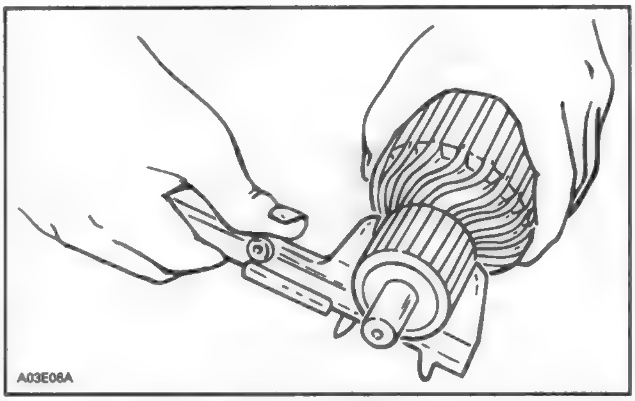
Check the commutator for mica depth. If the depth is less than 0.20 mm (.008 in), undercut the mica. Be sure that no burrs are left and no copper dust remains between the segments after the undercutting operation is completed.



1. *Commutator undercut 0.20 mm (.008 in)*

Check the commutator out-of-round condition with V Blocks and an indicator. If the commutator out-of-round is more than 0.40 mm (.016 in), the commutator should be turned on a lathe.

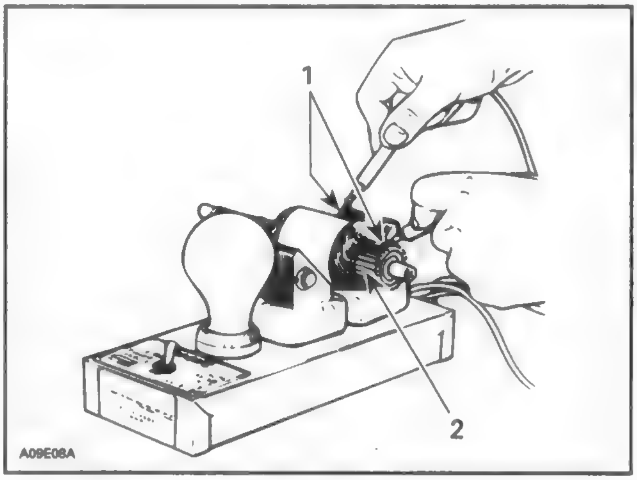
Check commutator outer diameter. If less than specified value, replace starter.



MODEL	WEAR LIMIT
All models	27 mm (1.063 in)

Test for Ground Circuit in the Armature

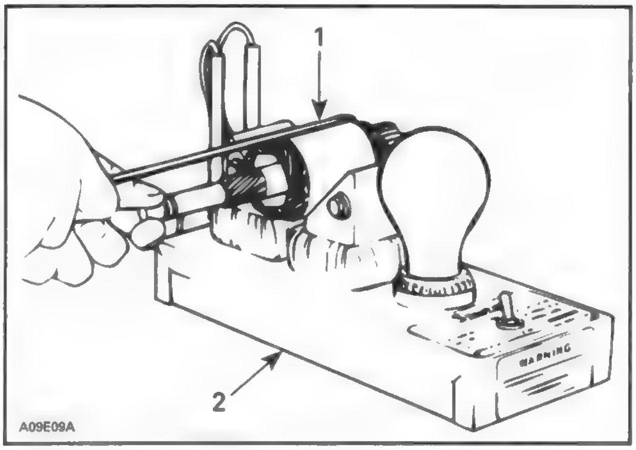
Use growler test probes. Check between armature core and the commutator bars. If growler lamp turns on, bars are grounded. If so, replace starter.



1. *Test probes*
2. *Commutator bars*

Test Armature for Shorted Winding

When the armature is rotated in the growler with a steel strip (hacksaw blade) held above it, the strip will vibrate over that area of the armature which has short circuit. Replace starter.



1. *Steel strip (hack-saw blade)*
2. *Growler*

Test the Armature for Open Circuit

Use growler test probes. Place one test probe on a commutator bar and the other test probe on the neighboring bar. Repeat this operation for all bars, moving one test probe at a time. If the growler lamp does not turn on, the armature circuit between these 2 bars is opened. The starter should be replaced; open circuits most often occur at the commutator riser where coils are soldered. (Burnt commutator bars are usually an indication of an open-circuit armature coil.)

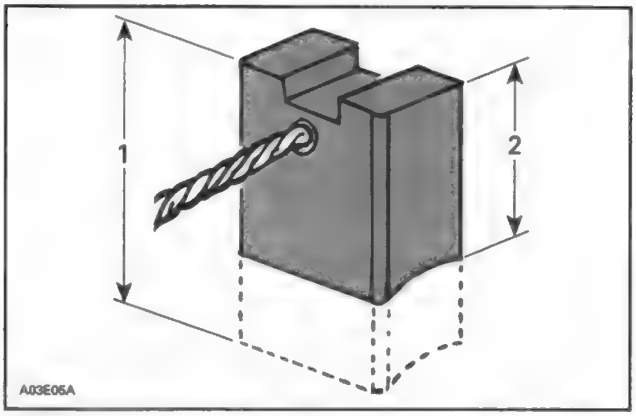
Brush Holder

Check the brush holder for insulation using growler test probes. Place one test probe on the insulated brush holder and the other test probe on the brush holder plate. If the growler lamp turns on, the brush holder has to be repaired or replaced.

Brush Length

Measure brush length. If less than the specified value, replace them.

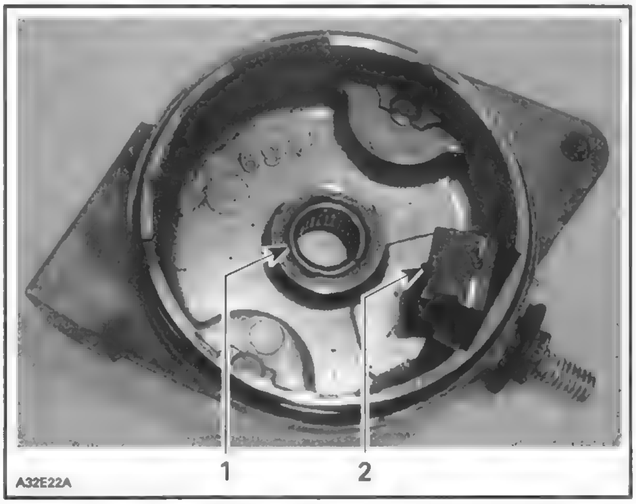
MODEL	LENGTH	
	NEW	WEAR LIMIT
All	10 mm (.400 in)	6 mm (.236 in)



TYPICAL
1. *New*
2. *Wear limit*

End Housing

Check the mica insulation of the positive brush and also the roller bearing condition. Replace, if necessary.



1. *Roller bearing*
2. *Positive brush*

Overrunning Clutch

The pinion of the overrunning clutch should turn smoothly in a clockwise direction, and should not slip in a counterclockwise direction. If defective, replace.

Check the pinion teeth for wear and damage. If defective, replace.

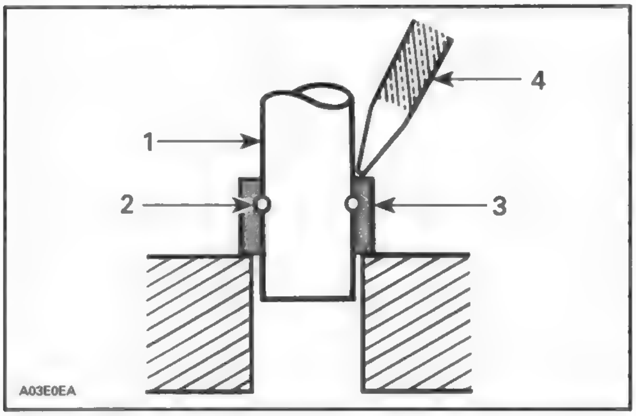
Starter Assembly

Reverse the order of disassembly to reassemble starter. However, attention should be paid to the following operations.

Prior to assembling, coat sliding surfaces on armature shaft splines, overrunning clutch and bushing with ThermoLube synthetic grease (P/N 219 700 417).

After placing collar **no. 3** on armature shaft , fit new snap ring **no. 2** on armature shaft, then make sure that it is properly secured.

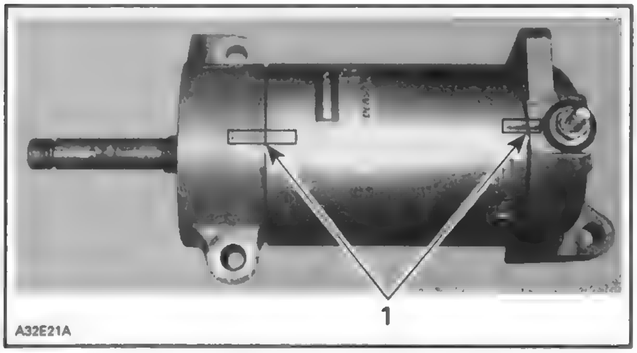
Slide collar **no. 3** over snap ring **no. 2** and secure in place by punching it at two or three places.



1. *Armature shaft*
2. *Snap ring*
3. *Collar*
4. *Punch*

Starter Housing Assembly and Starter Housing

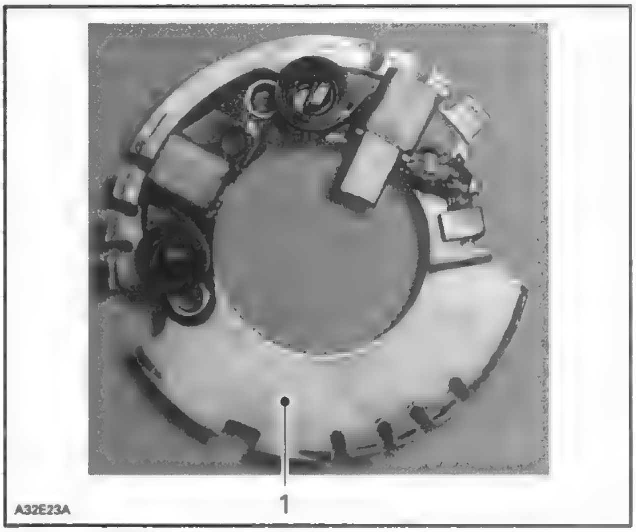
Align previously traced indexing marks.



TYPICAL
1. *Aligned indexing marks*

Open brushes and slide over commutator.

Align end frame locating notch with yoke locating protrusion and properly sit brush holder **no. 13** into housing **no. 14**.



1. *Brush holder*

To ease end frame installation, retain brush holder with a small screwdriver while installing armature assembly.

CAUTION: Make sure to place two end housings on a flat surface before tightening the through bolts.

CAUTION: Make sure end frame fits perfectly on yoke.

Starter Installation

Install removed parts in the reverse order of removal, pay attention to the following.

Make sure that starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.

Replace all scotch grip screws.

For ease of installation, install the three new starter mounting screws loosely before torquing. Torque the two mounting torx screws first, then the hex screw to 28 N•m (20 lbf•ft).

Install engine mounting bolts and torque to 25 N•m (18 lbf•ft).

Install remaining engine components, refer to *ENGINE REMOVAL AND INSTALLATION* section.

Connect the RED wire to the large terminal of the starter.

⚠ WARNING

Always disconnect ground cable first and connect last.

Torque starter terminal nut to 7 N•m (62 lbf•**in**).

Install the positive battery cable, then the negative cable.

DIGITALLY ENCODED SECURITY SYSTEM (DESS)

SERVICE TOOLS

Description	Part Number	Page
FLUKE 111 multimeter	529 035 868	326
DESS post interface tool	529 036 019	326

GENERAL

The following components are specially designed for this system: ECM, DESS key and DESS post.

This system allows the engine to reach pulley engagement speed only if a programmed DESS key is installed on DESS post.

NOTE: Actually, it is the memory of the ECM which is programmed to recognize the digital code of the DESS key.

The DESS key contains a magnet and a ROM chip. The magnet actually closes the reed switch inside the post which is the equivalent of a mechanical ON/OFF switch. The chip has a unique digital code.

The DESS system is quite flexible. Up to 8 DESS keys may be programmed in the memory of the ECM. They can also be erased individually.

NOTE: If desired, a DESS key can be used on other vehicle equipped with the DESS. It only needs to be programmed for that vehicle.

Engine Starting

When starting the engine with a DESS key on the post, the DESS is activated and will emit audible signals:

- 2 short beeps indicate a working DESS key. Vehicle can be driven, it allows engine to rev above 3000 RPM.
- Repetitive short beeps indicates a wrong DESS key is being used or that something is defective. Vehicle can not be driven. Refer to table below.

DESS Beeper Codes

DESS SIGNAL		**DESCRIPTION**	
BEEPER	DISPLAY MESSAGE		
2 shorts	WELCOME... or SKI-DOO	Welcome message, good key	
Slow short repetitive beeps	CHECK KEY	Unable to read key (bad connection)	Make sure the key is free of dirt or snow. Reinstall key and restart engine. Vehicle can not be driven.
Fast short repetitive beeps	BAD KEY	Invalid key or key not programmed	Use the proper key for this vehicle or have the key programmed. Vehicle can not be driven.

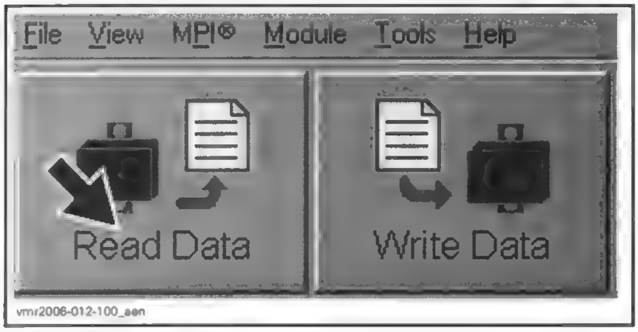
PROCEDURES

DESS KEY

DESS Key Programming

Use the latest B.U.D.S. software available from BOSSWeb. Refer to *COMMUNICATION TOOLS/B.U.D.S. SOFTWARE* for proper connection instructions.

Read **ECM** using **Read Data** button.


File View MPI® Module Tools Help
Read Data
Write Data
vmr2006-012-100_aen

500SS/800R

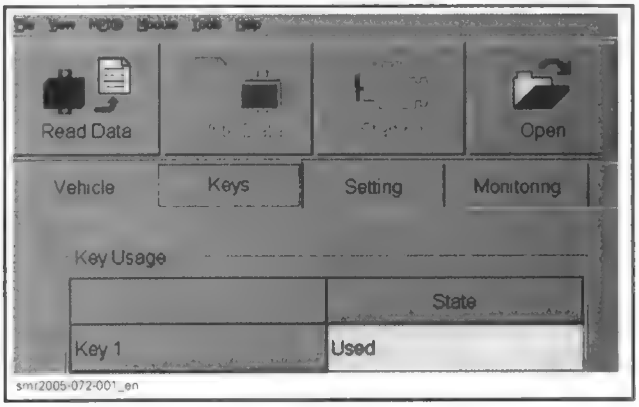
Install the new key to be programmed on vehicle DESS post.

600 HO SDI

Install the new key to be programmed on DESS post interface tool (P/N 529 036 019).

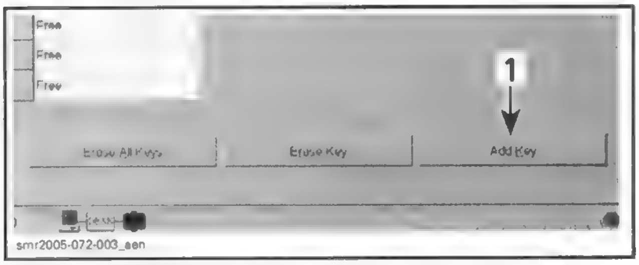
All Models

Click on **Keys** tab.


Read Data
Open
Vehicle
Keys
Setting
Monitoring
Key Usage
smr2005-072-001_en

	State
Key 1	Used

Click on **Add Key** button on bottom of screen.

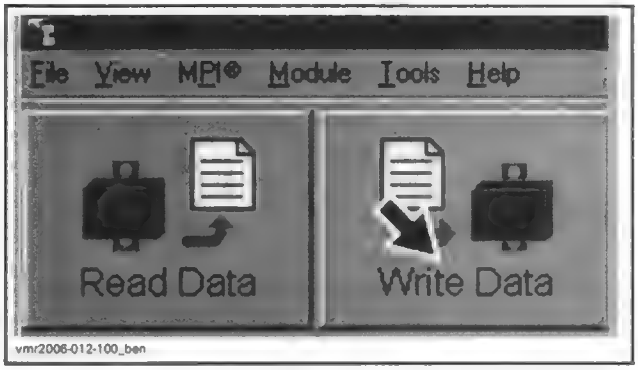

Free
Free
Free
1
Erase All Keys
Erase Key
Add Key
smr2005-072-003_aen

1. Click on this tab

A new key is now saved in the computer.

NOTE: To program other key(s), install a new key and click again on **Add Key** tab.

Ensure to save new data in **ECM** using **Write Data** button.


File View MPI® Module Tools Help
Read Data
Write Data
vmr2006-012-100_ben

BEEPER

NOTE: The beeper is a built-in component of the multifunction display gauge and cannot be replaced alone.

DESS POST

DESS Post Continuity Test

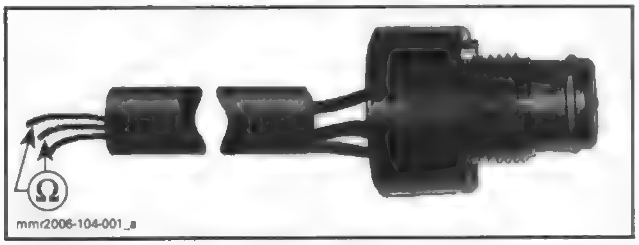
The following continuity tests can be performed using the FLUKE 111 multimeter (P/N 529 035 868).

Disconnect DESS post wires.

DESS Key Removed from Post

Connect test probes to DESS post as per tables and measure resistance.

DESS POST		RESISTANCE Ω @ 20°C (68°F)
WIRE		
BLACK/ GREEN	BLACK/ WHITE	Open circuit


Ω
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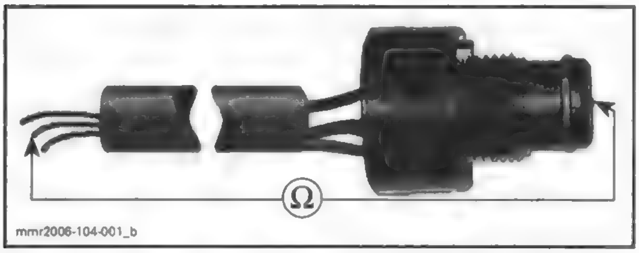
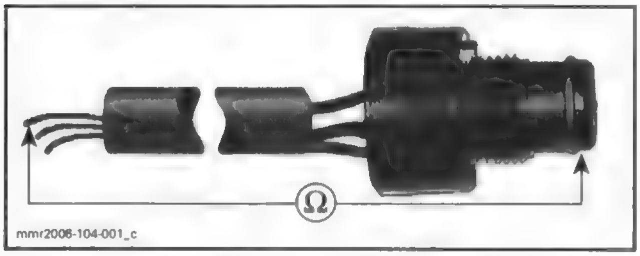
DESS POST		RESISTANCE Ω @ 20°C (68°F)
WIRE		
WHITE/ GRAY	Post terminal	Close to 0 Ω


Ω
mmr2006-104-001_b

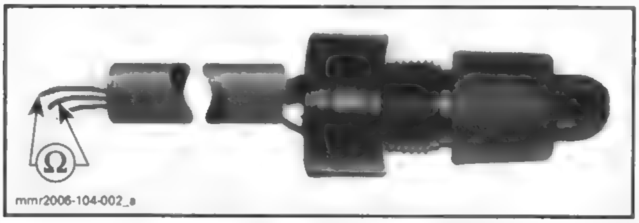
DESS POST		RESISTANCE Ω @ 20°C (68°F)
WIRE		
BLACK/ GREEN	Post ring	Close to 0 Ω


Ω
mmr2006-104-001_c

DESS Key on Post

Connect test probes to DESS post as per table and measure resistance.

DESS POST		RESISTANCE Ω @ 20°C (68°F)
WIRE		
BLACK/ GREEN	BLACK/ WHITE	Close to 0 Ω


Ω
mmr2006-104-002_a

If any resistance test fails, replace DESS post.

ROTAX ELECTRONIC REVERSE

SERVICE TOOLS

Description	Part Number	Page
ECM adapter	420 277 010	332–333
FLUKE 111 multimeter	529 035 868	330
Supply T-harness	529 035 869	331
12 volts battery supply cable	529 035 997	331

GENERAL

There are 3 main components used for the RER system:

- RER switch
- ECM
- RER trigger coil.

The ECM receives signals from both trigger coils for forward and reverse engine rotation.

NOTE: Refer to *IGNITION SYSTEM* for trigger coils testing.

The ECM recognizes a signal sent by the RER switch.

On manual start models, when switch is activated and engine is not running, nothing takes place.

When switch is activated and engine is running, the ECM cuts off ignition. Therefore, engine RPM gradually drops. When engine reaches a low threshold RPM, the ECM sends an ignition spark at a great advance creating a thrust which reverses engine rotation.

Both trigger coil signals are used by the ECM for forward or reverse engine operation.

Under a threshold low RPM or above 4300 RPM, the RER function is disabled. Nothing takes place when pressing RER button.

TROUBLESHOOTING

RER Does Not Respond When Depressing RER Button

Check if engine RER switch works properly.

Check switch voltage input and output.

Engine Stops after Pressing RER Button

This confirms that RER switch works.

Check trigger coil.

RER Works Erratically

Check engine compression. A low compression engine may result in RER working erratically making you think the problem is an electronic problem.

Check piston condition. Verify piston condition through the intake and exhaust ports. Look for scoring on piston skirts. Scored piston skirts may result in RER working erratically making you think the problem is an electronic problem.

Check RER switch.

PROCEDURES

RER SWITCH

Testing Signal with B.U.D.S.

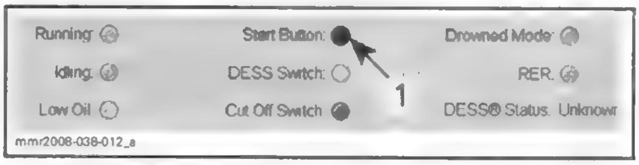
If Available

Use the latest B.U.D.S. software available from BOSSWeb. Refer to *COMMUNICATION TOOLS/B.U.D.S SOFTWARE* for proper connection instructions.

A quick operation test can be done using the **Monitoring** section in B.U.D.S.

Set engine cut-out to OFF.

Press vehicle START/RER button and look at the START button LED. It should turn on, indicating START/RER switch, ECM and wiring are working.



1. *Should turn on (green)*

If light turns on, check trigger coils. Refer to *IGNITION SYSTEM.*

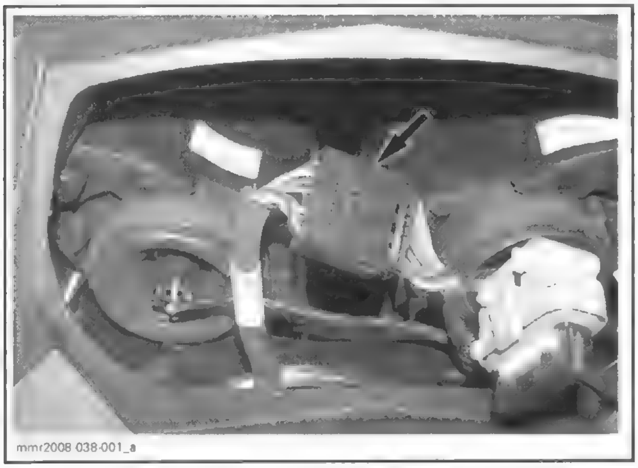
If light does not turn on, check START/RER switch as follows.

RER Switch Continuity Test

500SS and 800R models

Remove multifunction gauge. Refer to *BODY*.

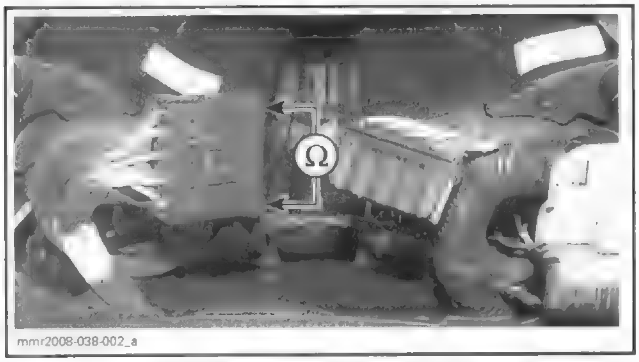
Disconnect 13-pin connector of the steering harness.



mmr2008-038-001_a

Measure switch continuity as follows using the FLUKE 111 multimeter (P/N 529 035 868).

SWITCH POSITION	WIRES		RESISTANCE
Released	RED/GREY	BEIGE	High value or infinite (0L)
Pressed and held			Continuity (0.2 Ω max.)



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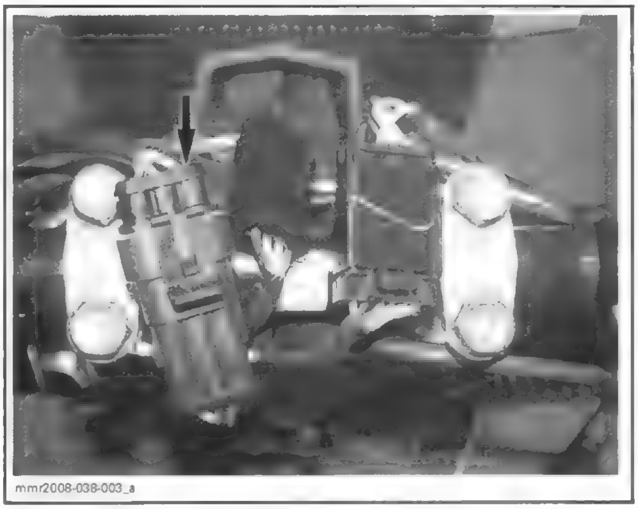
If continuity test fails, check wires/connectors going to START/RER switch.

If wires and connector are good, replace switch.

600 HO SDI Models

Disconnect the 3-pin connector of switch harness.



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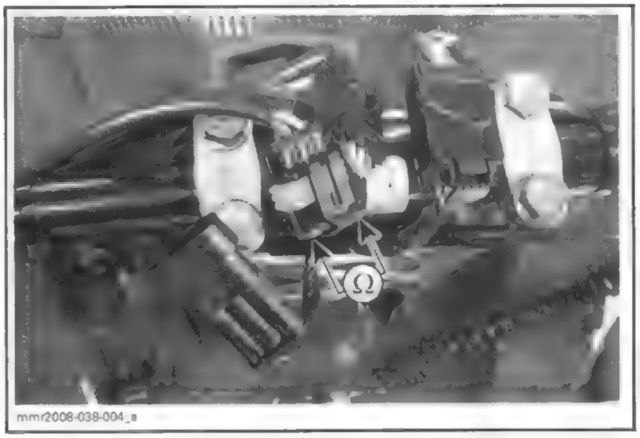
Measure continuity of switch as follows using the FLUKE 111 multimeter (P/N 529 035 868).

SWITCH POSITION	WIRES		RESISTANCE
Released	BLACK	RED	Continuity (0.2 Ω max.)
	BLACK	WHITE	High value or infinite (0L)
Pressed and held	BLACK	RED	High value or infinite (0L)
	BLACK	WHITE	Continuity (0.2 Ω max.)



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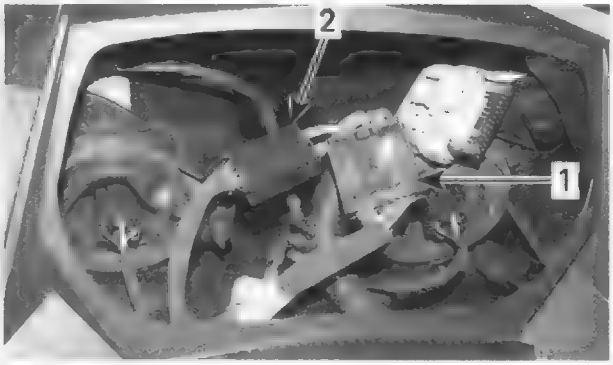
If continuity test fails, replace switch.

If continuity is good, reconnect 3-pin connector and recheck continuity as follows.

Remove multifunction gauge. Refer to *BODY*.

Disconnect steering connector (11-pin) and the 8-pin connector.



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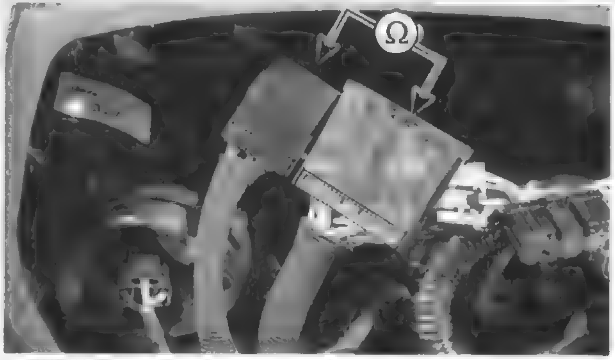
1. *Steering connector (11-pin)*
2. *8-pin connector*

SWITCH POSITION	WIRES		RESISTANCE
Released	BLACK/BLUE 11-pin connector	BEIGE 8-pin connector	Continuity (0.2 Ω max.)
	BEIGE 8-pin connector	RED/ BROWN 11-pin connector	High value or infinite (0L)
Pressed and held	BLACK/BLUE 11-pin connector	BEIGE 8-pin connector	High value or infinite (0L)
	BEIGE 8-pin connector	RED/ BROWN 11-pin connector	Continuity (0.2 Ω max.)



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If continuity was not good, repair harness.

RER Switch Input Voltage Test

500SS and 800R

If continuity tests were good, measure voltage on harness side of connector as follows.

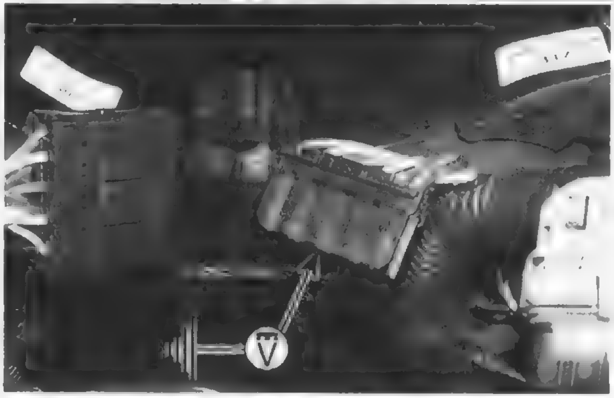
On manual start models, use the following tools to supply power to the ECM for this test.

- Supply T-harness (P/N 529 035 869)
- 12 volts battery supply cable (P/N 529 035 997)
- 12 volts battery.

Refer to *LIGHTS, INSTRUMENTS AND ACCESSORIES* for proper connections.

On electric start models, install DESS key on post.

MANUAL START		
WIRE		VOLTAGE
RED/GREY	Engine ground	12 Vdc
ELECTRIC START		
WIRE		VOLTAGE
RED/GREY	Battery ground	12 Vdc



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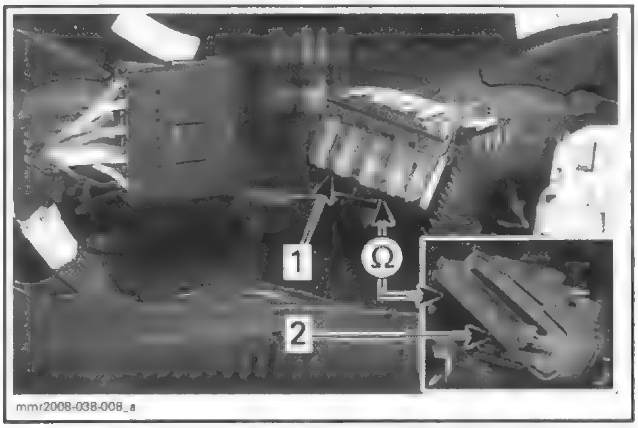
If voltage is not appropriate, check RED/GREY power wire coming from voltage regulator (from battery on electric start models). Also check the 5 A fuse on electric start models.

If voltage is good, disconnect ECM connector and check wire continuity between steering connector and ECM as follows.

ENGINE TYPE	STEERING CONNECTOR WIRE	ECM CONNECTOR WIRE	RESISTANCE
500SS	RED/GREEN	PIN 8	Continuity (0.2 Ω max.)
800R	RED/WHITE	PIN 8	Continuity (0.2 Ω max.)

If it tests good, try a new ECM.

If test fails, repair open circuit.



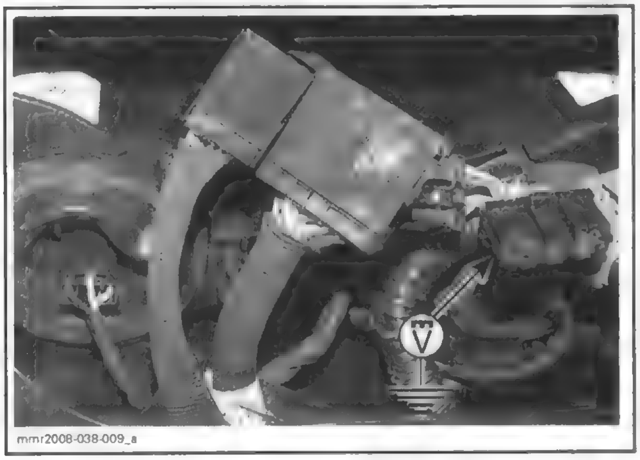
1. *Steering connector (main harness side)*
2. *ECM connector*

600 HO SDI Models

If continuity was good, measure voltage on harness side of steering 11-pin connector as follows.

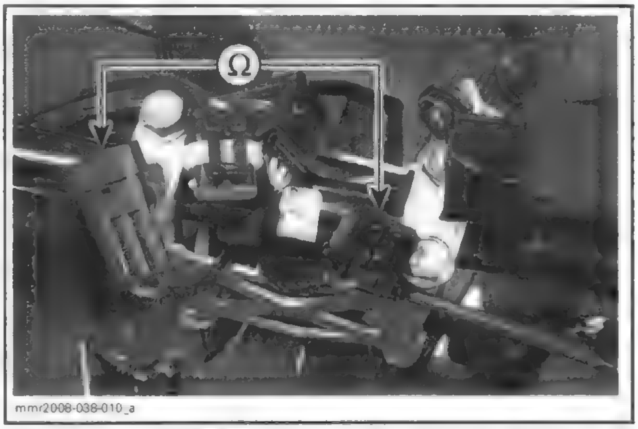
On electric start models, install DESS key on post.

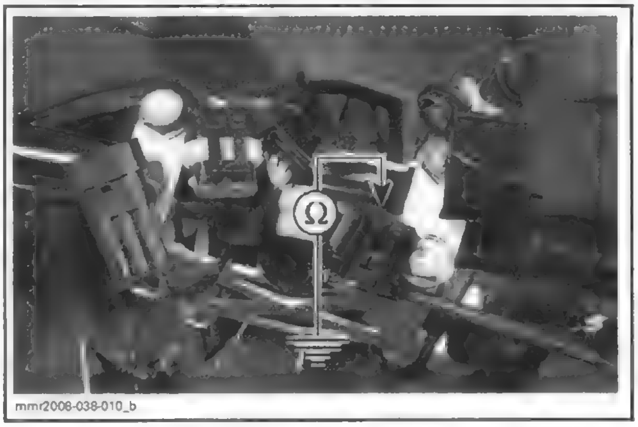
MANUAL START		
WIRE		VOLTAGE
RED/BROWN	Engine ground	12 Vdc
ELECTRIC START		
WIRE		VOLTAGE
RED/BROWN	Battery ground	12 Vdc



If voltage is not appropriate, check fuse (5 A) and RED/BROWN power wire coming from voltage regulator.

If voltage is good, check continuity of BLACK/BLUE wire from 3-pin connector to RH side connector then from RH side connector to engine ground. Repair/replace connector/wiring if test fails.

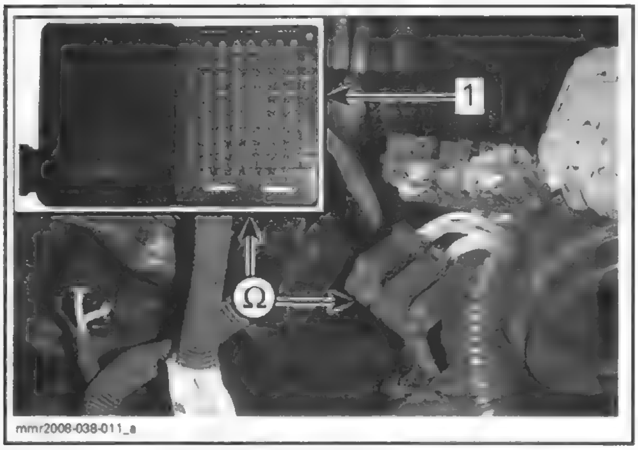




Also, if voltage is good, disconnect ECM connector B and connect to ECM adapter (P/N 420 277 010). Check wire between 8-pin connector and ECM adapter.

CAUTION: To prevent damage to female terminals, never probe directly into ECM connector. Always use ECM adapter (P/N 420 277 010) for this purpose.

8-CONNECTOR WIRE	ECM ADAPTER PIN	RESISTANCE
BEIGE	B 19	Continuity (0.2 Ω max.)



1. *ECM Adapter (P/N 420 277 010)*

If it tests good, try a new ECM.

If test fails, repair open circuit.

RER Switch Output Voltage Test

All Models

Measure switch voltage output from main harness side of steering connector as follows.

SWITCH POSITION	WIRES		RESISTANCE
Pressed and held	BEIGE	GROUND	Approximately 12 Vdc
Released	BEIGE	GROUND	Close to 0 Vdc

If test fails, replace switch.

BEEPER (REVERSE ALARM)

The reverse alarm (beeper) is integrated in the gauge cluster and is also used for emitting the vehicle beep codes. If the beeper does not function, you will have to change the gauge.

To test it, start vehicle. You should hear the beeper on start up. If you do not hear the beeper on start up, check for fault codes and refer to *MONITORING SYSTEM/FAULT CODES* section.

Press the Start/RER button to put the vehicle in reverse. You should hear slow long beeps advising you that you are in reverse.

If you hear 3 short beeps, the reverse selection failed. Try the procedure again.

LIGHTS/GAUGE/ACCESSORIES

SERVICE TOOLS

Description	Part Number	Page
ECM adapter	420 277 010	341
Fluke 111 multimeter	529 035 868	335, 340–341, 350
supply harness	529 035 869	336–337
supply cable	529 035 997	336

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
Fluke rigid back probes	TP88	335

GENERAL

NOTE: On applicable models, it is a good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to *MONITORING SYSTEM/FAULT CODES*.

CAUTION: The charging system fuse should always be removed before carrying out any maintenance on the vehicle to prevent any unexpected electrical activation. Removal of this fuse isolates the battery from the vehicle electrical system, except for the starter relay input terminal.

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

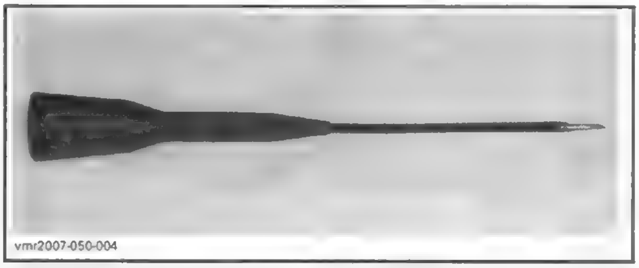
⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to. Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.) must be replaced with new ones.

Diagnostic Tools

To perform verifications, use the Fluke 111 multimeter (P/N 529 035 868).

To easily probe wire terminals through the back of their connectors, use Fluke rigid back probes (P/N TP88) or equivalent. They can be inserted at the end of the standard probes of the Fluke 111 multimeter (P/N 529 035 868).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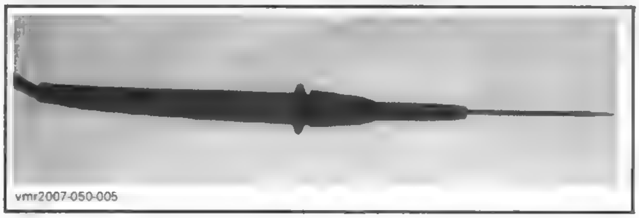
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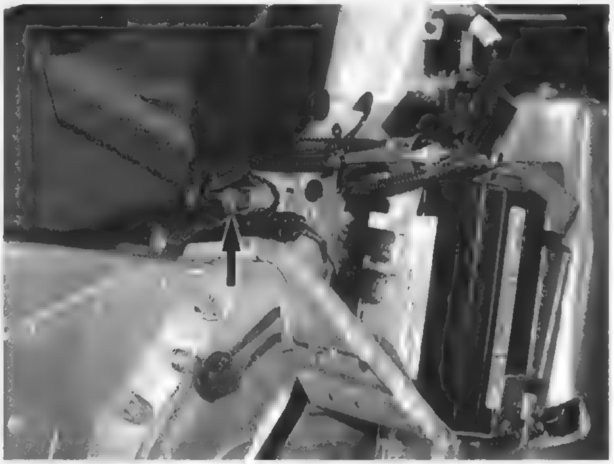
DIAGNOSTIC

LIGHTING AND ACCESSORIES SYSTEM TESTING

500SS/800R

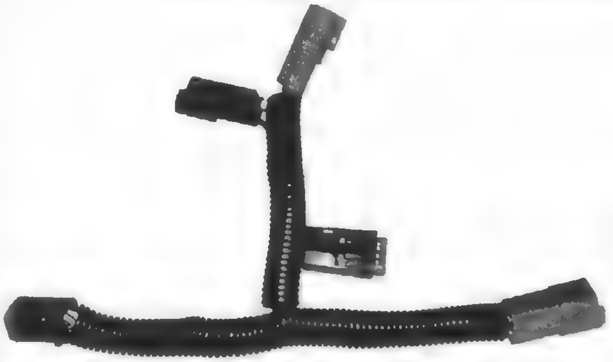
To provide power to the lighting and accessories systems for testing, carry out the following steps.

Remove the 6-pin diagnostic connector from protective cap on vehicle.



TYPICAL – REMOVE DIAGNOSTIC CONNECTOR

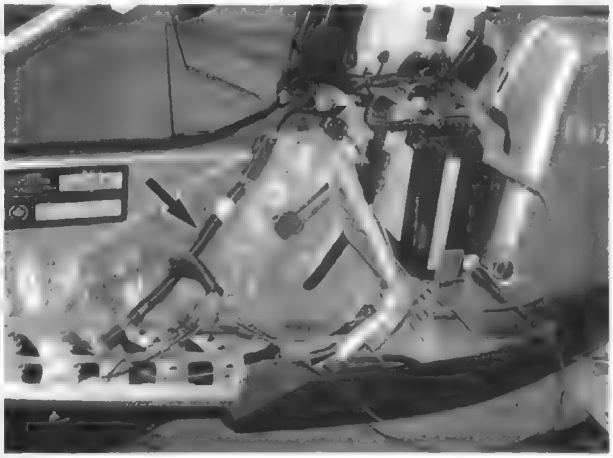
Connect supply harness (P/N 529 035 869) to the 6-pin connector of vehicle.



Connect supply cable (P/N 529 035 997) to the supply harness.

Connect supply cable clips to vehicle battery. Ensure to match RED wires together and BLACK wires together.

NOTE: On manual start models, use an external 12 V battery.



SUPPLY HARNESS CONNECTION TO DIAGNOSTIC CONNECTOR

NOTE: It is suggested to disconnect the headlights or to connect a battery charger to reduce battery discharge rate.

Refer to appropriate wiring diagram in *WIRING DIAGRAMS* section to troubleshoot lighting system.

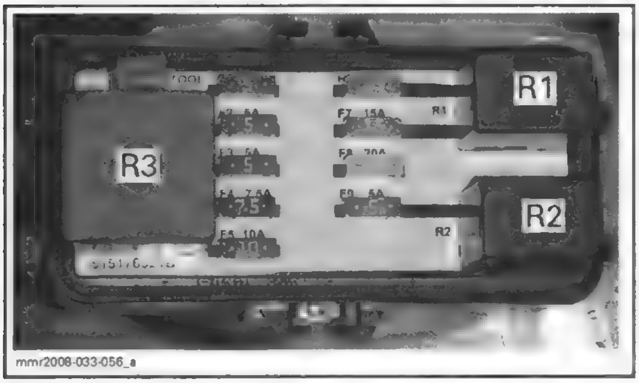
CAUTION: Always use the proper supply harness and cables. Always respect polarity when connecting cable clips to battery. Match RED cables together.

When testing is completed, disconnect supply cable clips from battery, and remove supply harness and supply cable from vehicle. Reconnect the 6-pin diagnostic connector in its cap.

600 HO SDI

To provide power to lighting and accessories systems, carry out the following steps.

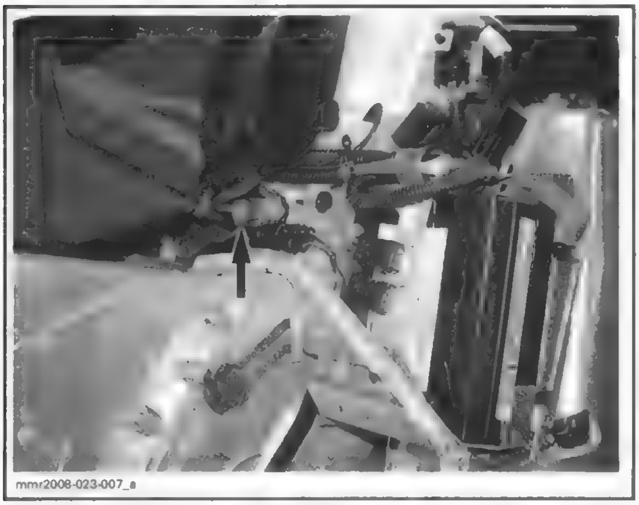
In the fuse box, remove the accessory relay (R3).



REMOVE R3

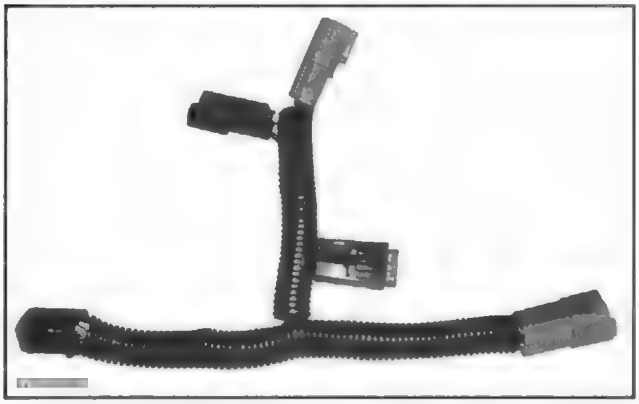
Install an appropriate insulated jumper between pins 1B and 3C. This will by-pass the relay and apply power to the accessory circuits once the ECM is awake.

Remove the 6-pin diagnostic connector from protective cap on vehicle.



TYPICAL LOCATION— ALL MODELS

Connect supply harness (P/N 529 035 869) to the 6-pin connector of vehicle.



Connecting the supply harness will wake up the ECM and energize the circuits up to R3 without any other selection.

NOTE: It is suggested to disconnect the headlights or to connect a battery charger to reduce battery discharge rate.

NOTE: SDI models already have a 12 V battery; they do not need an external battery to allow troubleshooting. The use of the supply harness will keep the ECM ON to give you more time to work. Not using it will allow the ECM to shut-off after approximately 30 seconds.

Use the applicable wiring diagram in *WIRING DIAGRAMS* section to troubleshoot lighting and accessories systems.

Once testing is complete, disconnect supply harness from vehicle and reconnect the 6-pin diagnostic connector in its cap.

Remove jumper in fuse box and install R3 accessories relay.

Test with B.U.D.S.

The 600 HO SDI accessory circuits can be powered for testing using the B.U.D.S. software.

Using the latest B.U.D.S. software, energize **relay 3** from the **Activation** tab.

Headlights should turn on.

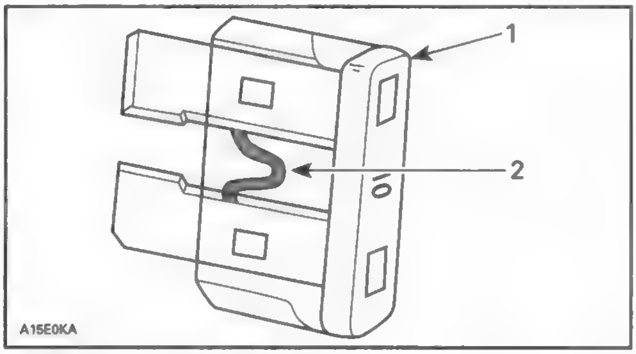
If the relay does not function, carry out an *R3 INPUT VOLTAGE TEST*. See procedure in this section.

PROCEDURES

FUSES

Fuse Inspection

Check if filament is melted. Replace as necessary.



1. *Fuse*
2. *Check if melted*

CAUTION: Do not use a higher rated fuse as this can cause severe damage to electric components and/or a fire.

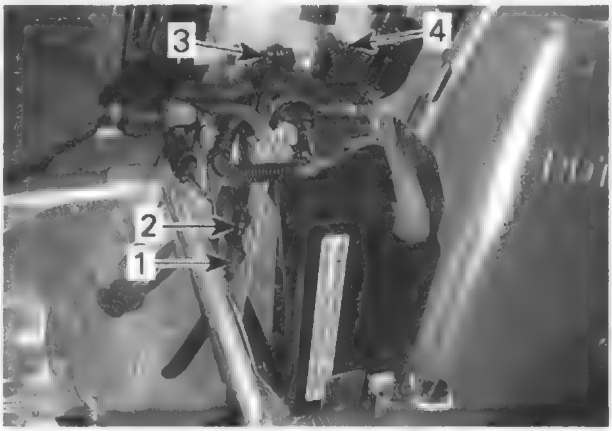
⚠ WARNING

If fuse has burnt out, the cause of the malfunction should be determined and corrected before restarting.

Fuse Location

500SS/800R

All the fuses except for the fuel level sensor fuse are located near the battery. The illustration below depicts the locations of the various fuses as in an electric start model. The fuses applicable to the manual start models (accessories and headlights fuses) will be in the same locations.



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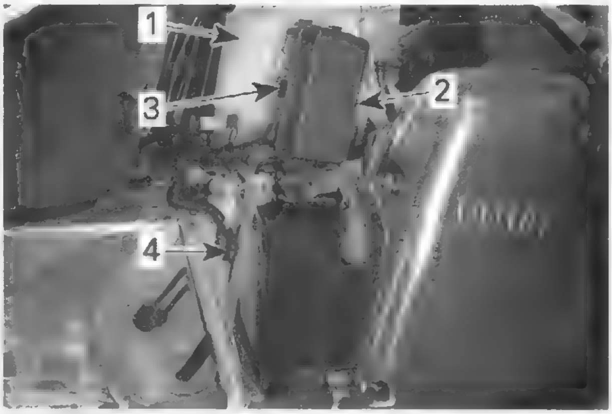
TYPICAL – FUSE LOCATIONS (ELECTRIC START MODEL SHOWN)
1. *Starting fuse*
2. *Charging system fuse*
3. *Accessories fuse*
4. *Headlights fuse*

600 HO SDI

Except for the charging system fuse and the fuel level sensor fuse, all fuses are located in a fuse box mounted on the oil tank.

The charging system fuse is located on the LH side of the battery support (when facing it).



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1. *Oil tank*
2. *Fuse box*
3. *Cover latch (one each side)*
4. *Charging system fuse*

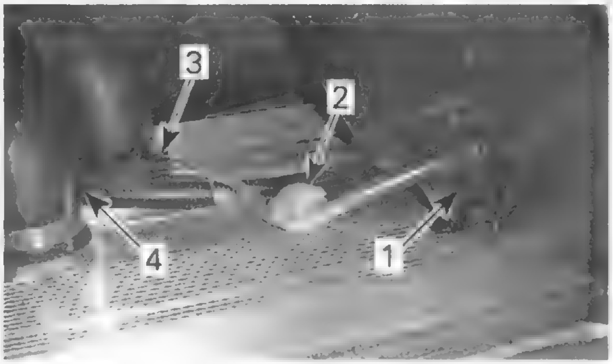
All Models

Fuel Level Sensor Fuse

The fuel level sensor circuit is protected by an in line fuse located near the sensor. It is an integral part of the wiring that comes with the sensor assembly.

To access the fuel level sensor fuse, remove the primary silencer from the engine air inlet system.

NOTE: In the following illustration, the fuel tank was moved back for access and clarity of illustration.



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1. *Fuel level sensor*
2. *In-line fuse*
3. *Connector*
4. *Connector routing*

Fuse Description

500SS/800R

MODEL	FUSE	DESCRIPTION	LOCATION
Manual start	15 A	Headlight (FD)	Attached to oil tank
	15 A	Accessories (FC)	

MODEL	FUSE	DESCRIPTION	LOCATION
Electric start	5 A	Start (FB)	LH side of battery support
	15 A	Headlight (FD)	Attached to oil tank
	15 A	Accessories (FC)	
	30 A	Charging system (FA)	LH side of battery support
	0.25 A	Fuel level sensor (in-line type)	Behind primary air inlet silencer

600 HO SDI

MODEL	FUSE	DESCRIPTION	LOCATION
All 600 HO SDI	0.25 A	Fuel gauge (in-line type)	Behind primary air inlet silencer
	5 A	Outer injectors (F1)	Fuse box (above battery)
	5 A	Inner injectors (F2)	
	5 A	ECM (F3)	
	15 A	Gauge/accessories relay/start solenoid (F4)	
	5 A	Relay 1, 2/start button (F9)	
	10 A	Fuel pump/ignition coil (F5)	
	15 A	Headlights (F7)	
	15 A	Accessories (F6)	
	20 A	Capacitor (F8)	
	30 A	Charging system (FA)	Side of battery support

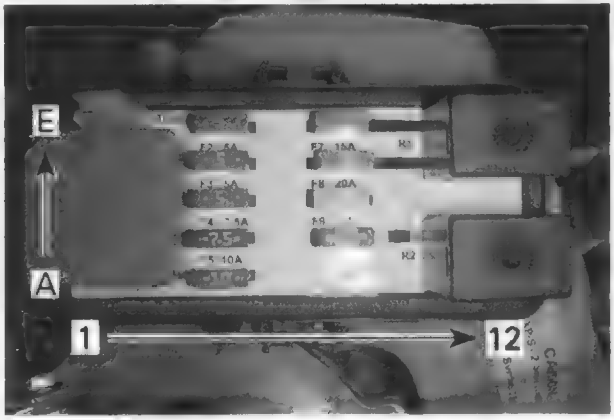
Fuses are identified on a decal on the face of the fuse box.

A variety of spare fuses are stored on the inside of the fuse box cover.

A fuse removal tool is located just above the large relay on the left side of the box.

The following illustration denotes the layout of the contacts in the fuse box , when referring to the wiring diagram contact numbers (IE. fuse F9 contact 8B).

Numbers 1 to 12 identifies the vertical rows while A to E identifies the horizontal rows.



FUSE CONTACT LAYOUT

RELAY R1 (LIGHTS AND ACCESSORIES)

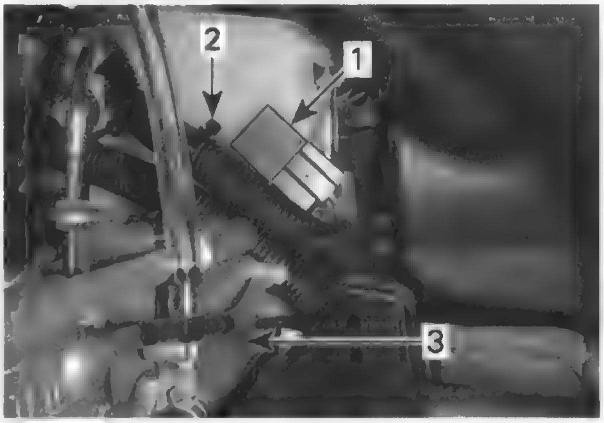
500SS/800R

R1 Description

The lights and accessories relay (R1) is attached to the vehicle main wire harness by its connector and a locking tie.

To access R1, remove the following:

- Left side panel
- Drive belt guard
- Primary silencer on the engine air inlet system.



1. *Lights and accessories relay (R1)*
2. *R1 locking tie*
3. *Throttle bodies*

It receives power to its input contact (pin 30) and activation coil (pin 85) directly from the voltage regulator/rectifier when the engine is running. The ECM (pin 28) provides the ground signal to the coil (pin 86) when the engine reaches approximately 800 RPM.

Once closed, it supplies power to the lights and accessories:
- Headlights
- High beams indicator signal
- Tail/brake light
- Handle grips and throttle lever heaters
- 12 volt accessory connector.

R1 Input Voltage Test

Cut locking-tie securing relay to harness.

Remove R1 relay from its connector.

Start engine and test for power at the connector as follows.

RELAY R1	WIRE	VOLTAGE
Coil input	RD/BU and BK	10.5 to 13.5 Vdc
Contact input	RD/BU and ground	

NOTE: Engine idling (1500 to 1600 RPM).

If R1 input voltages are good, carry out a *RELAY CONTINUITY TEST*. See procedure in this section.

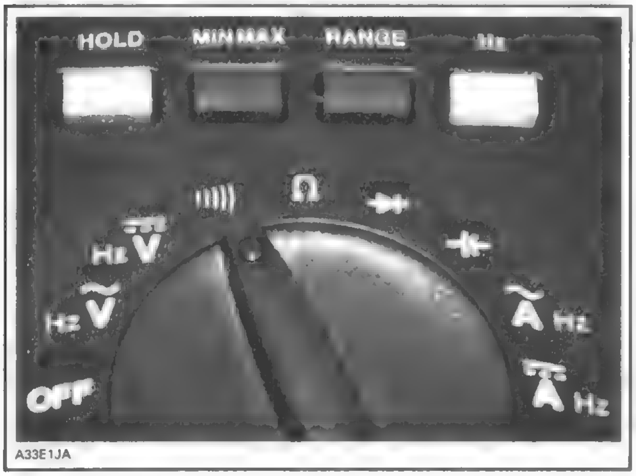
Also test continuity of ground signal circuit from ECM, OR/GN wire at relay connector to ECM connector pin 28.

If R1 input voltages are not as specified, test wiring/connections from voltage regulator/rectifier. Refer to *WIRING DIAGRAMS* for circuit details.

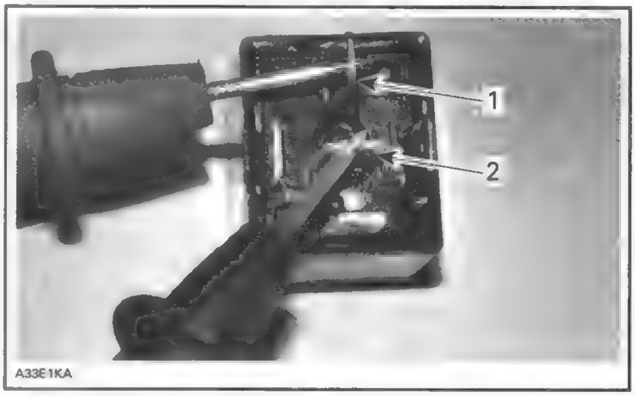
R1 Continuity Test

500SS/800R

Using the FLUKE 111 multimeter (P/N 529 035 868), select the beeper position.



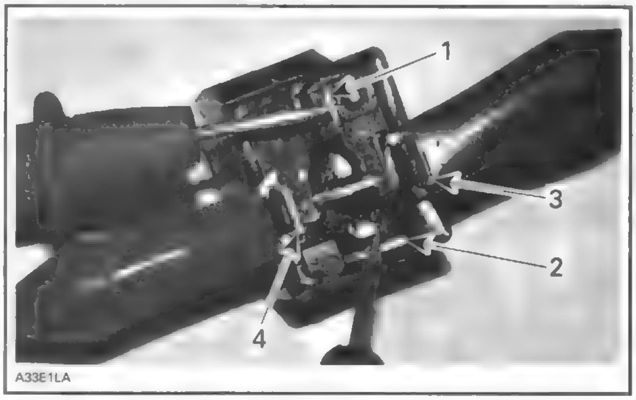
Position the RED probe on the terminal 30 and the BLACK probe on the terminal 87a.



1. *Terminal 30*
2. *Terminal 87a*

A continuous signal should be audible. If not, replace the relay.

If a signal is audible, apply 12 volts on terminals 85 and 86 then place the RED probe on terminal 30 and the BLACK on the terminal 87.



1. *Terminal 30*
2. *Terminal 87*
3. *Terminal 85*
4. *Terminal 86*

The continuous signal should be audible. If not, replace the relay.

RELAY R3 (LIGHTS AND ACCESSORIES)

600 HO SDI

R3 Description

The lights and accessories relay (R3) is located in the fuse box on the LH side.

R3 is a plug-in relay that can be installed inverted by 180° and still function correctly.

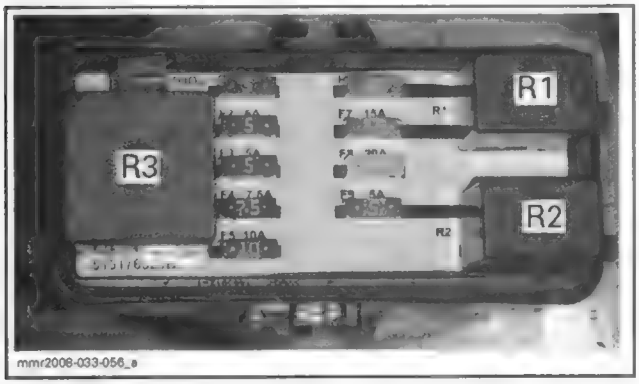
It receives power to it's input contact (1B) directly from the voltage regulator/rectifier when the engine is running.

Power to R3 activation coil (pin 3B) comes through relay R2 and fuse F4.

The ECM (pin 17) provides the ground signal to the coil (pin 1C) when the engine reaches approximately 800 RPM.

Once closed, it supplies power to the following lights and accessories:

- Headlights
- High beams indicator signal
- Tail/brake light
- Visor outlet.



RELAY LOCATIONS

R3 Input Voltage Test

To test R3 input voltages, remove relay R3 from fuse box.

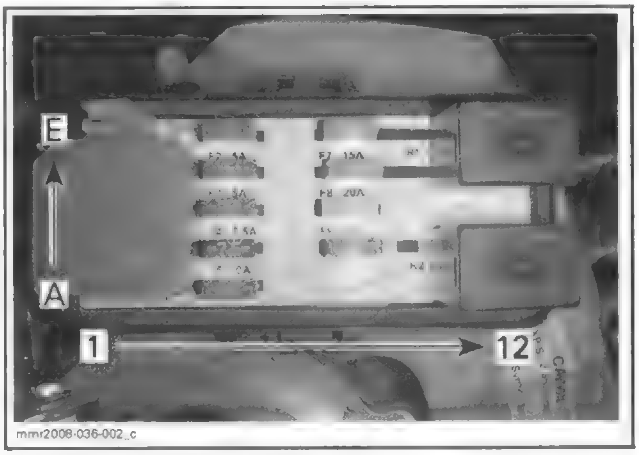
Use the Fluke 111 multimeter (P/N 529 035 868), and select the Vdc position.

Measure battery voltage at battery terminals.

Measure voltage at R3 fuse box contacts as follows.

RELAY R3	TEST PROBES	VOLTAGE
Coil	Pin 3B and ground	10.5 to 13.5 Vdc
Contact	Pin 1B and ground	

NOTE: Engine idling (1500 to 1600 RPM).

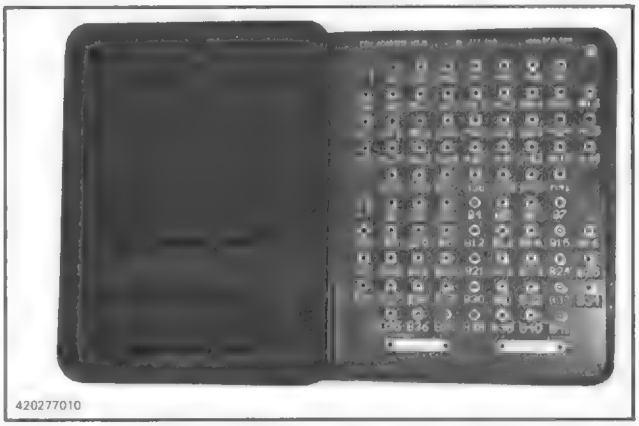


FUSE BOX CONTACT LAYOUT

If input voltages are good, carry out a *CONTINUITY TEST* of the relay. See procedure in this section.

Also test continuity of ground signal circuit from ECM, relay socket pin 1C to ECM connector pin 16.

NOTE: Use ECM adapter (P/N 420 277 010) when testing ground circuit to ECM.



If voltage readings at relay input are not as specified, test Fuse F4 and wiring/connections from F4 to R3 input contacts. Refer to *WIRING DIAGRAMS* for circuit details.

NOTE: If the electric starter functions, all fuses and relay connections are good. Test wiring and connections from F4 to R3 input contacts.

Repair or replace as required.

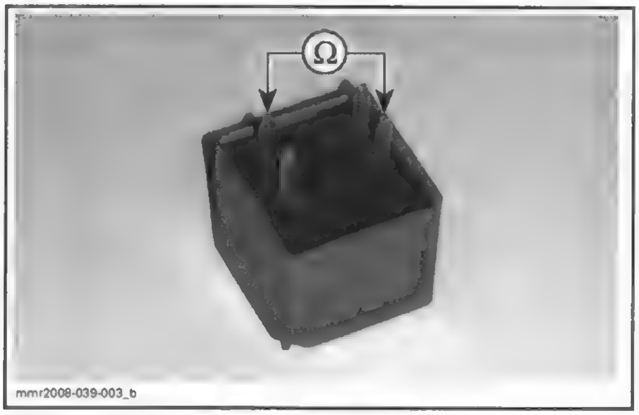
R3 Continuity Test

To carry out a continuity test, remove relay from fuse box.

Use a FLUKE 111 multimeter (P/N 529 035 868) set to Ω position.

Measure the resistance across relay terminals 30 and 87.

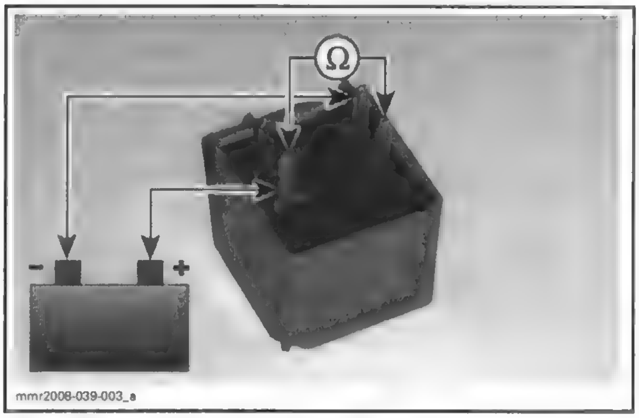
TERMINAL		RESISTANCE
30	87	Open circuit (0L)



mmr2008-039-003_b

Connect a battery between terminals 85 and 86, and measure the resistance across terminals 30 and 87 as shown in illustration.

TERMINAL		RESISTANCE
30	87	0.5 Ω max. (continuity)



mmr2008-039-003_a

If the relay failed the test, replace it.

HEADLIGHT

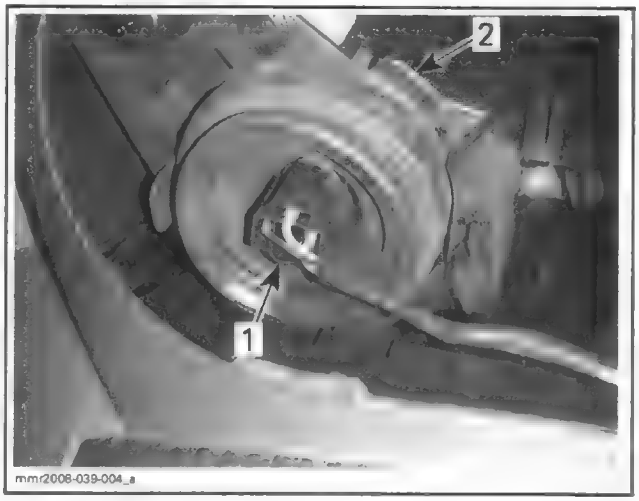
Headlight Bulb Removal

If a headlight bulb is burnt, proceed as follows.

Remove GAUGE, see procedure in this section.

Unplug bulb connector.

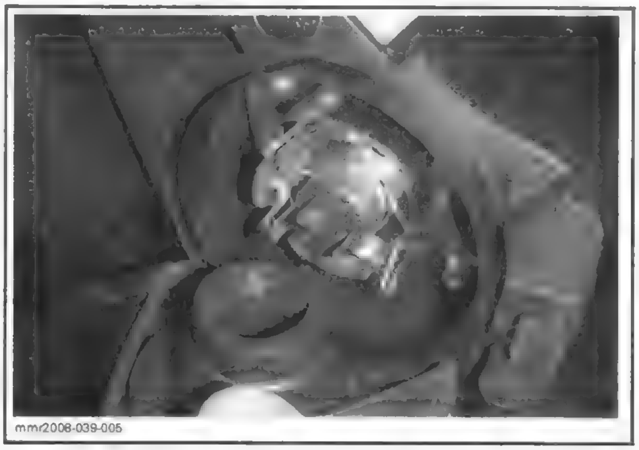
Remove top and center portion of rubber boot from headlight assembly.



mmr2008-039-004_a

1. *Remove headlight connector*
2. *Remove rubber boot*

NOTE: It is not necessary to fully remove rubber boot.



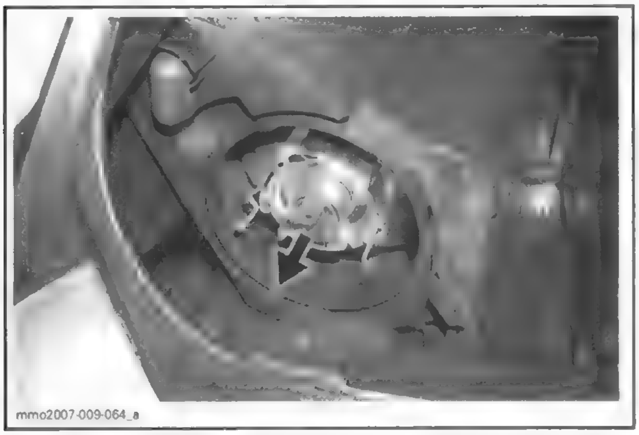
mmr2008-039-005

Press both sides of the bulb holder (spring clip) inwards at the same time, and pull it out to release it from the bulb support.

mmr2008-039-010_a

SQUEEZE INWARDS AND PULL OUT

Pull bulb from headlight assembly.



PULL TO REMOVE BULB

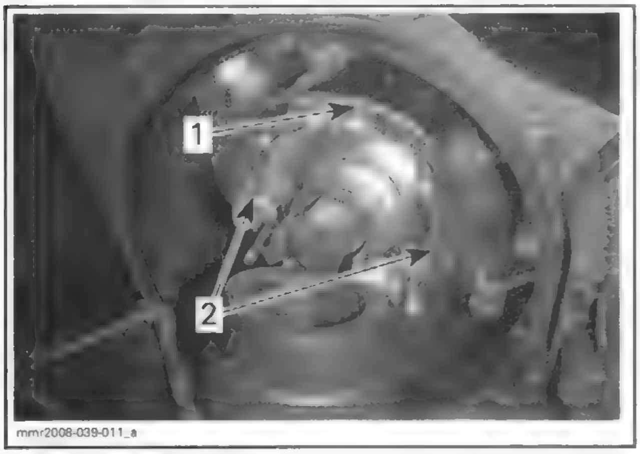
Headlight Bulb Installation

CAUTION: Never touch glass portion of a halogen bulb with bare fingers, it shortens its operating life. If glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

Insert bulb in light assembly.

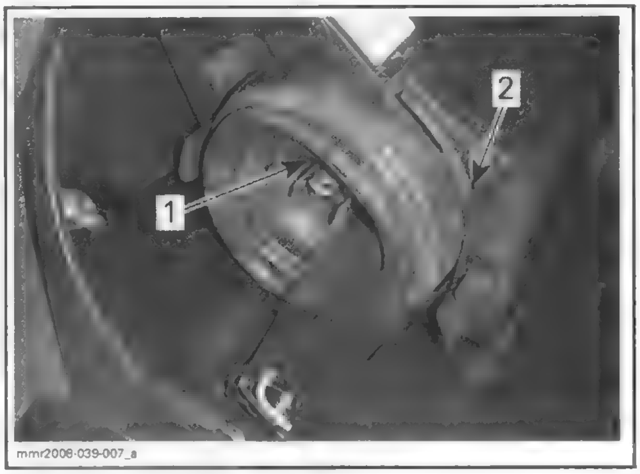
NOTE: Widest alignment tab on bulb should be at top of assembly.

Insert top of bulb holder (spring clip) as you squeeze the two sides inwards. Release bulb holder so that it locks in the grooves on either side of headlight assembly.



1. *Wide bulb tab*
2. *bulb holder locked*

Install rubber boot. Make sure cover is properly inserted in groove provided in the headlight assembly, and around the base of the bulb.



1. *Insert around bulb*
2. *Insert in groove provided*

Install light connector.

Always test light operation after bulb replacement.

Install gauge, see procedure in this section.

Headlight Test

If headlight(s) does not function, proceed as follows.

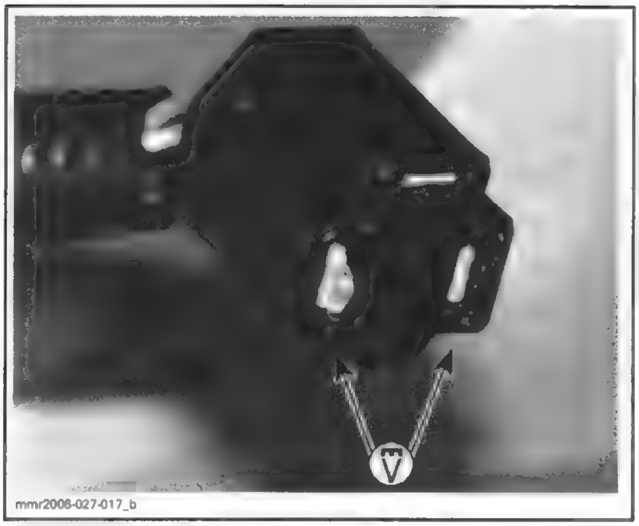
Remove gauge, see procedure in this section.

Disconnect headlight connector(s).

Apply electrical power to the headlights for testing. Refer to *LIGHTING AND ACCESSORIES SYSTEM TESTING* in this section for proper procedure.

Read voltage at headlight connector as follows.

SWITCH POSITION	WIRE COLOR (HEADLIGHT CONNECTOR)		VOLTAGE
LO beam	GY/VI	BK	Battery voltage (Vdc)
HI beam	GY	BK	



If voltage is inadequate, proceed as follows to find the source of the problem.

Check applicable fuse. Refer to *FUSES* in this section.

Test relay R1 (500SS/800R) or relay R3 (600 HO SDI).

Test headlight dimmer switch.

Test wiring harness and connectors.

Test voltage regulator/rectifier. Refer to *CHARGING SYSTEM*.

Headlight Beam Aiming

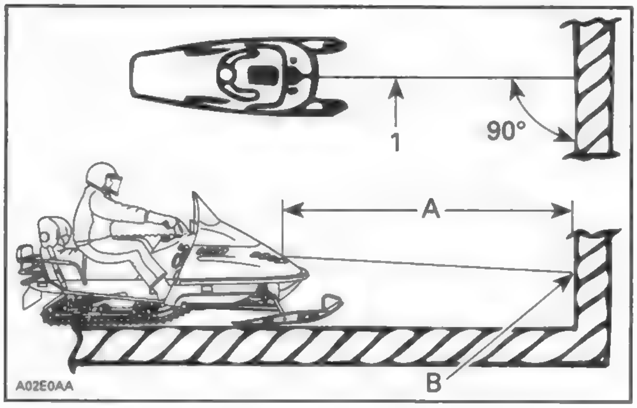
Beam aiming is correct when center of high beam is 25 mm (1 in) below the headlight horizontal center line, scribed on a test surface, 381 cm (12 ft 6 in) away.

Place the vehicle on a flat surface perpendicular to test surface (wall or screen) and 381 cm (12 ft 6 in) away from it.

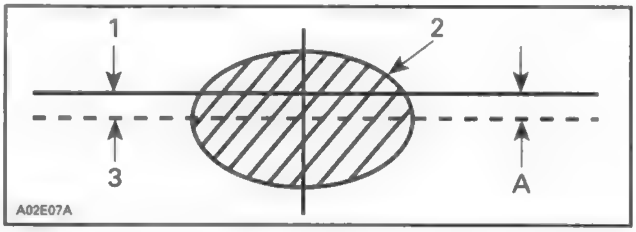
Rider or equivalent weight must be on the vehicle.

Select **high** beam.

Measure headight center distance from ground. Scribe a line at this height on test surface (wall or screen). Light beam center should be 25 mm (1 in) below scribed line.



TYPICAL
1. *Headlight center line*
A. *381 cm (12 ft 6 in)*
B. *25 mm (1 in) below center line*

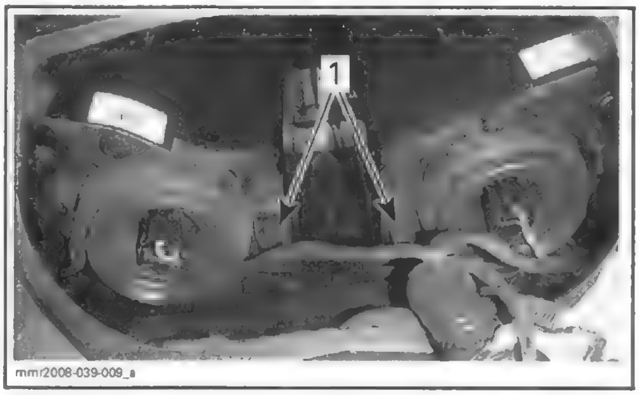


1. *Headlight horizontal*
2. *Light beam (high beam) (projected on the wall)*
3. *Light beam center*
A. *25 mm (1 in)*

Beam Aiming Adjustment

Remove gauge.

Turn knob on light assembly to adjust beam height.

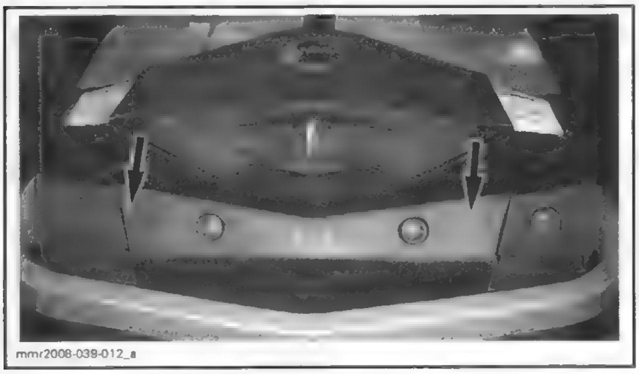


TYPICAL
1. *Beam height adjustment knobs*

TAILLIGHT

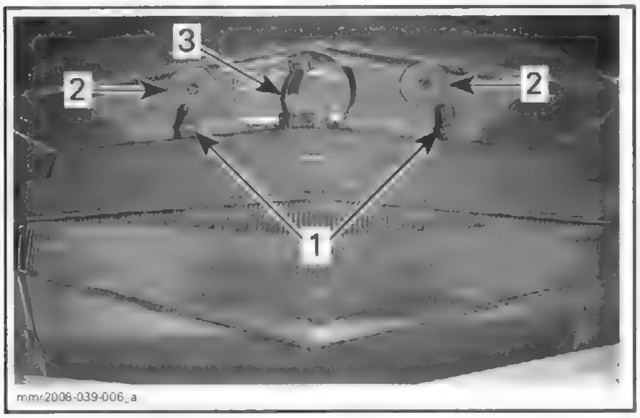
Taillight Bulb Replacement

Remove taillight lens by carefully pulling on lens at both ends.



CAREFULLY PULL OUT AT CORNERS

CAUTION: Taillight lens is held in place by two plastic pins inserted in rubber grommets. If lens is forced too far sideways when removing, the lens mounting pins may break and lens will have to be replaced. Do not pull lens out too far to avoid damaging wiring.



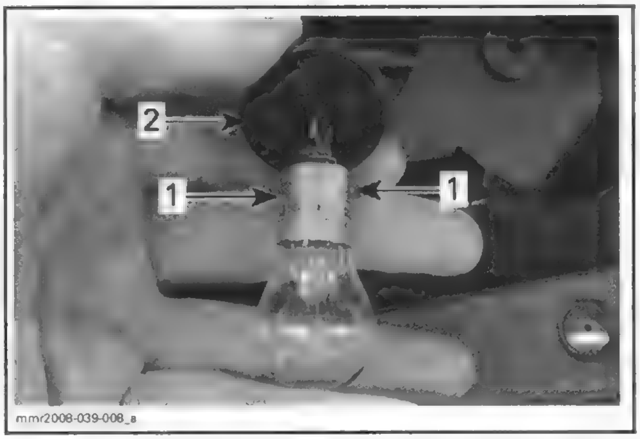
1. *Lens retaining pins*
2. *Retaining grommets*
3. *Light wire harness*

Rotate bulb holder counterclockwise to remove it from lens.

Push in and rotate bulb counterclockwise to remove it from its socket.

Install the new bulb by pushing it in the socket and turning it clockwise.

NOTE: Note position of bulb locking pins on its base, and bulb holder alignment key to lens.



1. *Bulb locking pins*
2. *Bulb holder alignment key*

Taillight Assembly Replacement

If the taillight lens is broken, see the *TAILLIGHT BULB REPLACEMENT* procedure in this section.

The taillight housing is part of the snow guard. If it needs to be replaced, refer to *FRAME* section.

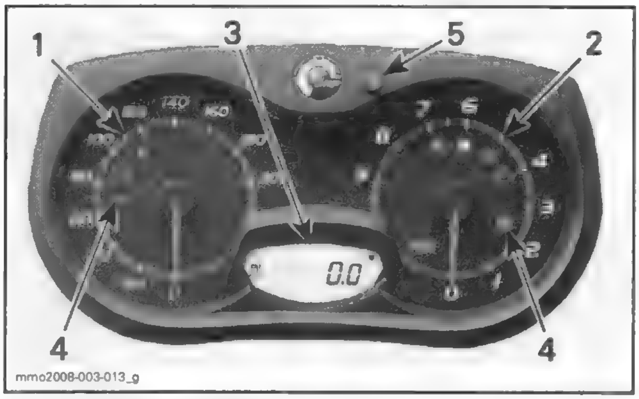
If the light bulb holder (socket) or wiring need to be replaced, you will have to lift up the rear of the fuel tank to access and disconnect the harness connector, refer to *FUEL TANK AND FUEL PUMP* section.

GAUGE

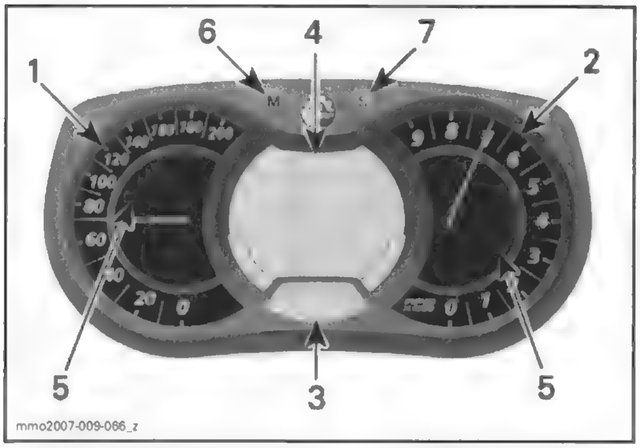
The REV XP platform uses two different type gauges which provides all indications in a single unit, an **analog/digital gauge** and a **multifunction analog/digital gauge (premium gauge)** used on X packages and GSX-limited models.

The premium gauge provides more functions and display features.

Both units can be set to indicate in metric or imperial units.



ANALOG/DIGITAL GAUGE
1. *Speedometer*
2. *Tachometer (RPM)*
3. *Gauge Digital Display*
4. *Gauge Pilot Lamps*
5. *Gauge SET "S" button*



MULTIFUNCTION ANALOG/DIGITAL GAUGE (PREMIUM)
1. *Speedometer*
2. *Tachometer (RPM)*
3. *Gauge Digital Display*
4. *Gauge Multifunction Digital Display*
5. *Gauge Pilot Lamps*
6. *Gauge MODE "M" button*
7. *Gauge SET "S" button*

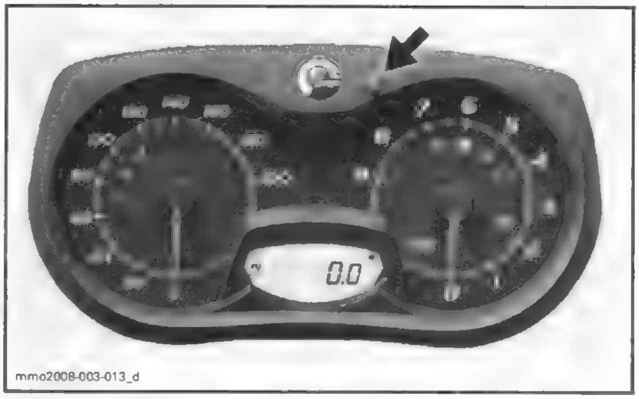
The premium gauge is also used to control 9 temperature settings for the heated hand grips and the heated throttle lever.

Refer to the operators manual for a full description of the indications and functions provided by each gauge.

Mode and Set Buttons

Analog/Digital Gauge

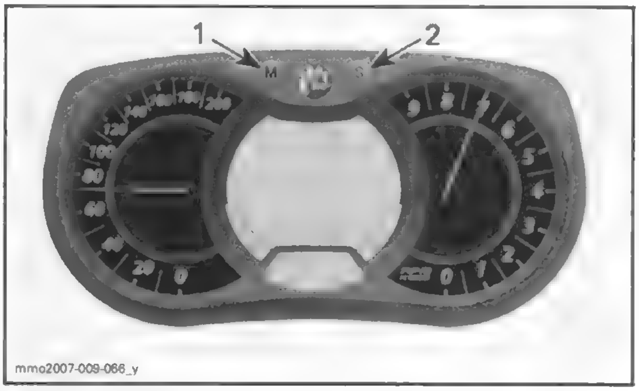
The standard gauge is equipped with a SET button only.



SET "S" BUTTON

Multifunction Analog/Digital Gauge (Premium)

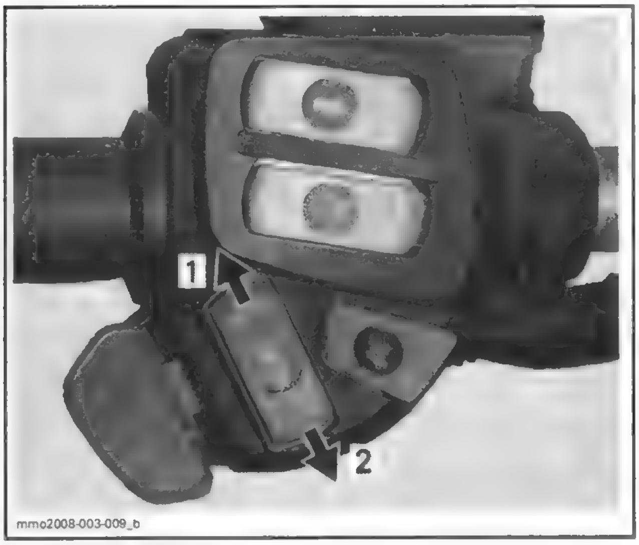
Premium gauge is equipped with MODE and SET buttons at the top of the indicator.



PREMIUM GAUGE
1. *MODE button*
2. *SET button*

These buttons allow you to toggle through the different functions and settings of the indicator.

The vehicles that are factory equipped with the premium gauge also come with a remote **M/S** button on the LH multifunction switch. It can be used instead of the buttons on the gauge simply by pressing the "**M**" for **MODE** and "**S**" for **SET**.



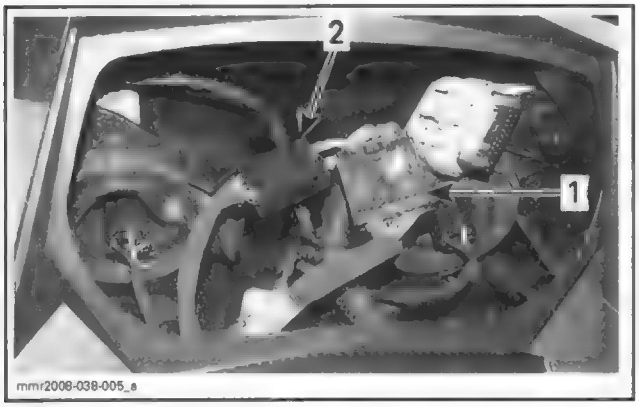
REMOTE M/S BUTTON
1. MODE selection "M"
2. SET selection "S"

Remote M/S Button Testing

If using the **M/S** button does not affect the indication, try using the buttons on the gauge. If they function, the remote **M/S** button circuit may be open.

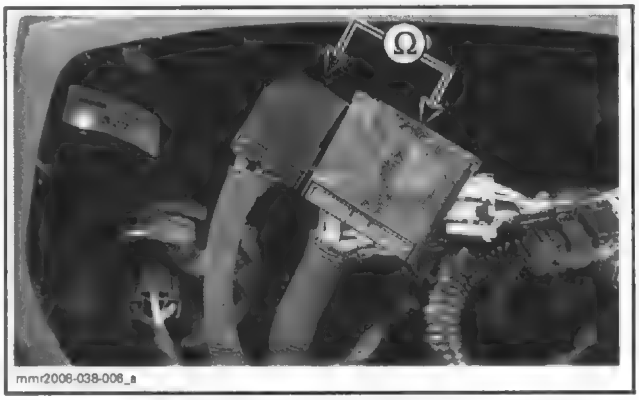
Remove the gauge.

Disconnect the HG connector and the AC connector.



TYPICAL
1. AC connector
2. HG connector

Using a multimeter set to Ω, carry out the following continuity test.



500SS/800R

SWITCH SELECTION	AC CONNECTOR WIRE	HG CONNECTOR WIRE	RESISTANCE
Centered	YL/BR	BK	Infinite Ω
	YL/GN		
"M"	YL/BR	BK	Close to 0 Ω
"S"	YL/GN		

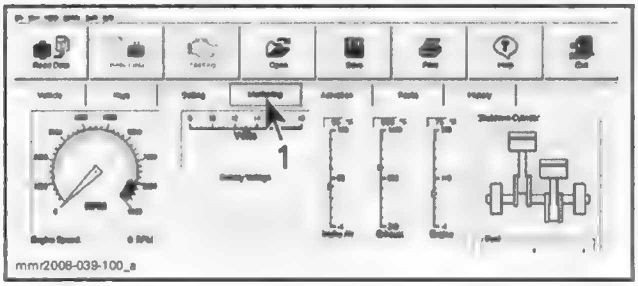
600 HO SDI

SWITCH SELECTION	AC CONNECTOR WIRE	HG CONNECTOR WIRE	RESISTANCE
Centered	YL/BR	BK/BU	Infinite Ω
	YL/GN		
"M"	YL/BR	BK/BU	Close to 0 Ω
"S"	YL/GN		

If you do obtain the values as specified, repair or replace switch, wiring and connections.

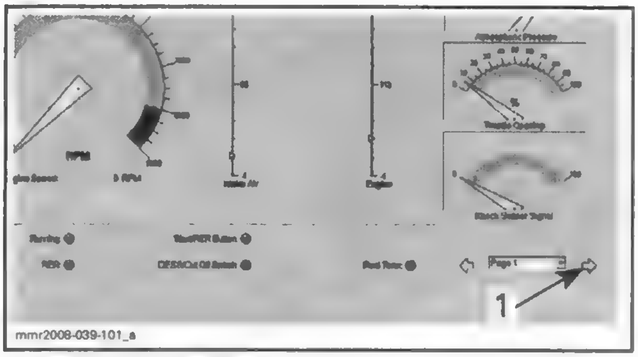
Remote M/S Button Testing With B.U.D.S.

Using the B.U.D.S. software, select the **Monitoring** tab.



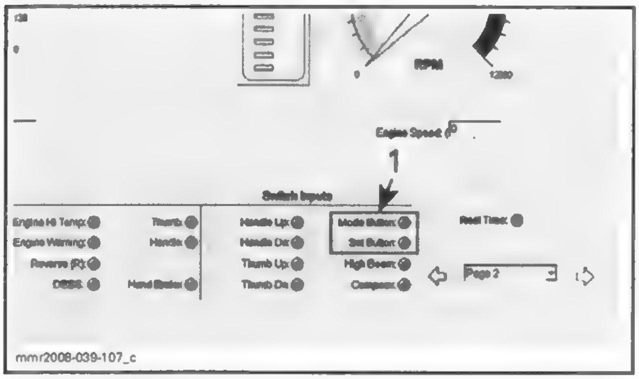
1. Monitoring tab

On the lower RH side of the monitoring page, click on the arrow next to the box that says **Page 1** and select **Page 2**.


RPM
Page 1
1
mmr2008-039-101_a

1. Press here to select Page 2

Alternately press on the "**M**" and "**S**" and look for applicable indicator light in the **Switch inputs** box to turn green. If they do, the remote **M/S** button is functioning correctly.


RPM
Engine Speed
1
Switch Inputs
Engine Hi Temp
Engine Warning
Reverse (R)
DESS
Thumb
Handle
Hand Brake
Handle Up
Handle Dn
Thumb Up
Thumb Dn
Mode Button
Set Button
High Beam
Compass
Real Time
Page 2
mmr2008-039-107_c

1. Indicator lights

How to Display "P" Codes

To activate **P CODE** mode, push and hold the "M" button for 2 seconds.

As you hold the "**M**" button, quickly turn ON and OFF the high beams a few times. The gauge should enter **P CODE** mode.

While in **P CODE** mode, use the "**M**" or "**S**" button to scroll over available failure codes.

Push and hold the "**M**" button to exit **P CODE** mode.

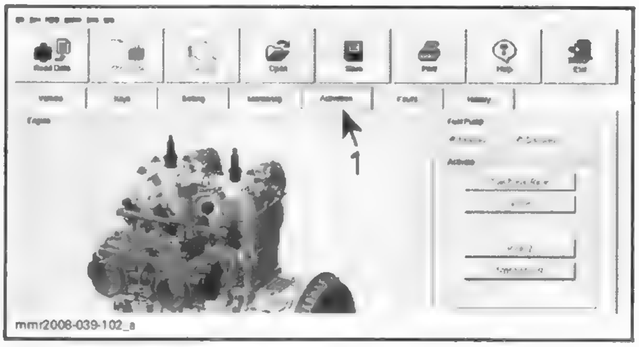
A **NO ACTIVE P CODE** message is displayed if there are no **P CODES** in memory.

Gauge Self Test

On **ECM wake-up**, the gauge will perform a self-test. All indications will come ON. You will have a few seconds to make sure the indications (**LEDs** and **LCDs**) are functioning correctly.

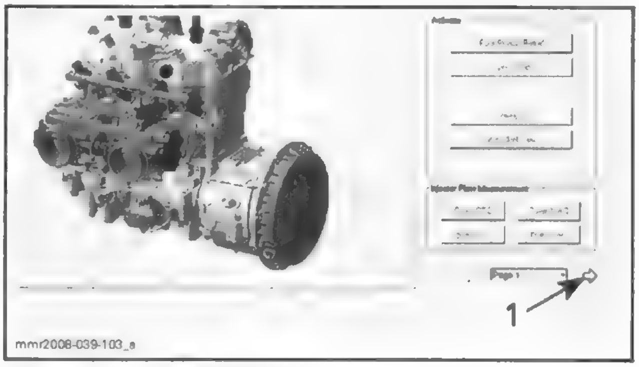
Gauge Test With B.U.D.S.

In B.U.D.S., choose the **Activation** tab.


1
mmr2008-039-102_a

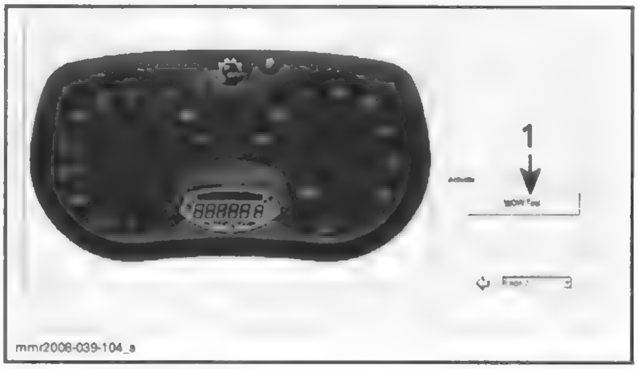
1. Activation tab

On the bottom of the activation page on the RH side, click the arrow next to the window that says **Page 1** and select **Page 2**.


Page 1
1
mmr2008-039-103_a

1. Press here to select Page 2

On **Page 2**, select the **WOW Test** button. All indications will come ON and stay ON allowing the time required to verify each indication.

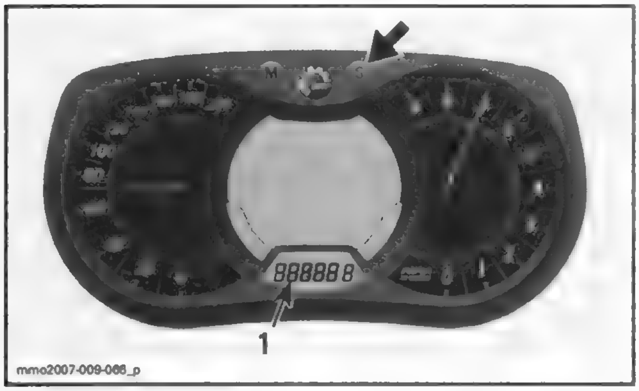

1
WOW Test
mmr2008-039-104_a

1. Select WOW Test button

NOTE: The **WOW Test** only test the gauges **LEDs** and **LCDs**. It does not test the actual circuit functions related to each indication.

Clock Activation (Premium Gauge)

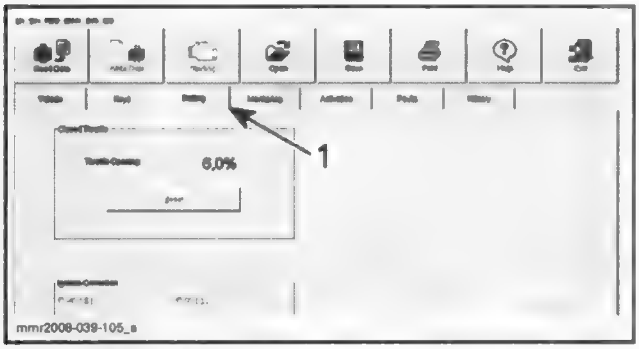
The gauge has an internal clock that can display the time of day in the lower digital display (when selected). This clock requires power from the vehicle battery to maintain the proper time of day.



1. Clock displayed

Without battery power, this clock resets every time the vehicle is shut down, then restarted. It is then only used as a timer.

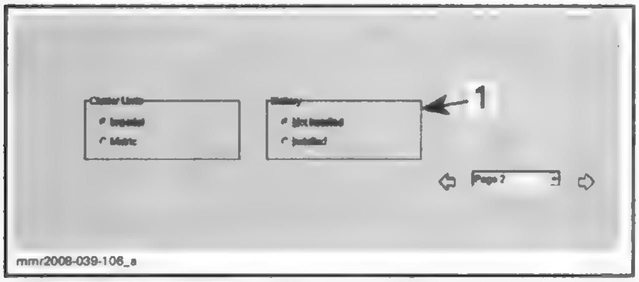
To activate the clock function in B.U.D.S., choose the **Setting** tab.



1. Choose Setting tab

On the bottom of the setting page on the RH side, click the arrow next to the window that says **Page 1** and select **Page 2**.

On **Page 2**, choose **Installed** in the **Battery** section if the vehicle is equipped with a battery. Choose **Not installed** if the vehicle does not have a battery.



1. Battery selection box

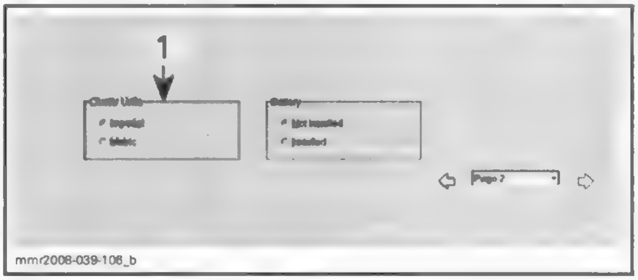
Changing Units of Measurement

The gauges are factory preset to indicate in metric units and can be changed using the B.U.D.S. software.

To change the gauge units of measure in B.U.D.S., first choose the **Setting** tab.

On the bottom of the setting page on the RH side, click the arrow next to the window that says **Page 1** and select **Page 2**.

Then select **Imperial** or **Metric** in the **Cluster** units box.



1. Cluster units box

NOTE: Speedometer, odometer and trip meter will have their units (kilometer or miles) changed all together.

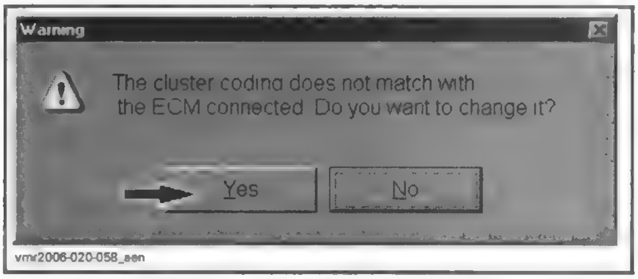
Gauge Replacement

NOTE: If the gauge is **replaced**, the engine will start but will not reach the RPM at which the driven clutch engages because of the security exchange coding. The gauge will need to be matched to the ECM for the vehicle to function normally.

Connect B.U.D.S. Refer to the *COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE* section.

Follow the instructions in the referenced section and in the software.

Once connected and activated, you will see a message similar to the following illustration.



Warning

The cluster coding does not match with the ECM connected Do you want to change it?

Make sure you have the right type and model gauge for the vehicle you are working on before answering **Yes**, otherwise it will not function properly.

Select **Yes** to continue.

Once the gauge has been matched to the ECM, you will need to set the units of measurement, Imperial or Metric, as well as the battery installed or not installed function for the clock. See procedures in this section.

Make sure the gauge functions properly and that all settings and indications are within parameters.

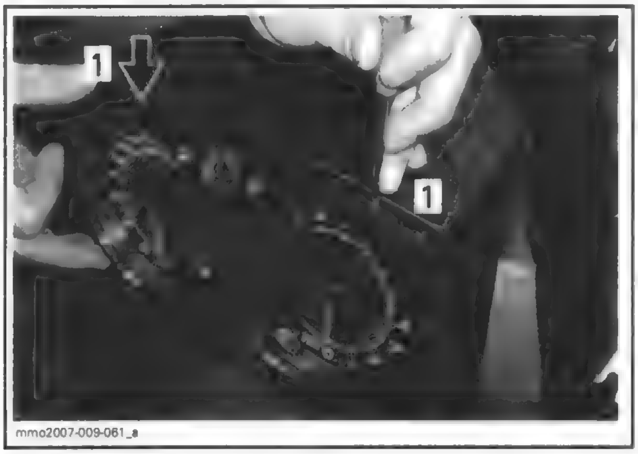
Shut down vehicle and disconnect the communication tools.

Gauge Removal

Insert a small screwdriver in one of the rectangular slots at top of gauge.

As you gently press down on the screwdriver to release multifunction gauge locking tab, pull out and hold gauge in position.

Insert screwdriver in second hole and press to release other tab.



1. Locking tabs

Gently pull multifunction gauge from gauge support.

mmo2007-009-062_a

Press on connector locking tab and pull connector off gauge.

Store gauge in a secure area to prevent it from being damaged.

Gauge Installation

Carefully align and install gauge connector, pressing it in until connector lock engages.

Insert bottom of gauge in gauge holder.

Press top of gauge in holder until you feel locking tabs engage in holder.

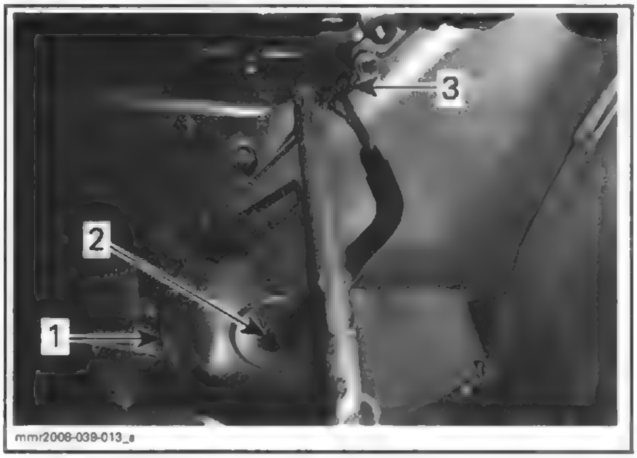
Start vehicle engine and test gauge functions.

SPEED SENSOR

The speed sensor is mounted in the chain case cover. It is sealed in the chain case cover and is replaced with the cover.

Speed Sensor Static Test

Locate speed sensor connector.



1. Chain case cover
2. Speed sensor
3. Speed sensor connector

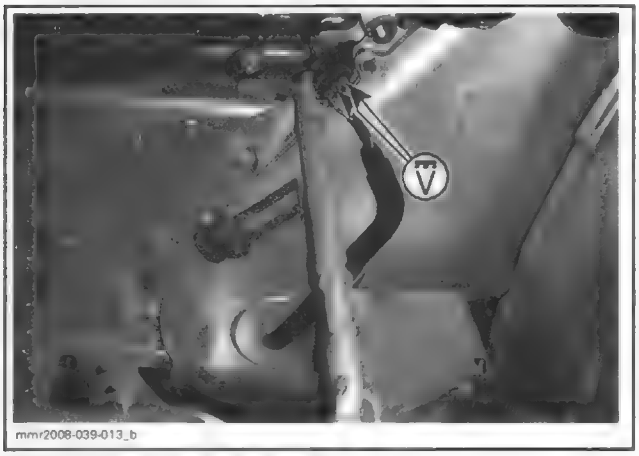
Lift and support back end of vehicle so that the track is completely off the ground.

Start engine and let it run at idle speed so that the driven pulley does not engage and track does not rotate.

To perform verifications, use the Fluke 111 multimeter (P/N 529 035 868) with Fluke TP88 rigid back probe pins or equivalent.

With multimeter set to Vdc,back-probe connector and read sensor supply voltage as follows.

SPEED SENSOR CONNECTOR (SENSOR SIDE)		VOLTAGE
RD	BK	Approximatly 12 Vdc



SENSOR INPUT VOLTAGE TEST

If you do not have proper supply voltage, shut down engine and carry out a continuity test of wiring from sensor to gauge. Refer to *WIRING DIAGRAMS* for circuit detail.

If supply voltage is good, measure the signal voltage as follows.

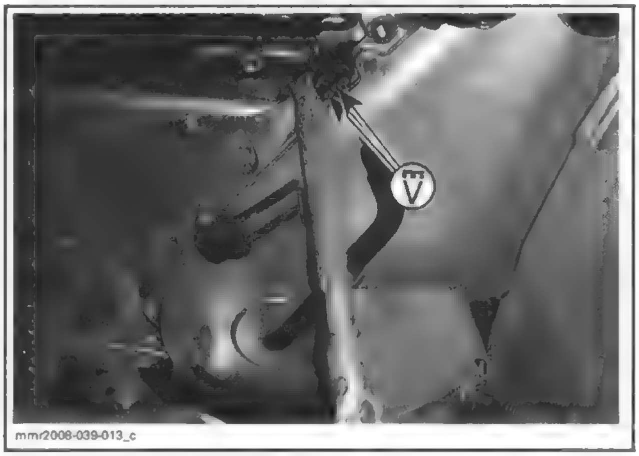
⚠ WARNING

Before accelerating engine to rotate track, ensure track is free of particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle. Never rotate at high speed.

Slowly accelerate engine so that driven pulley engages and **track rotates SLOWLY**.

Back-probe connector between GREEN and BLACK wires, read voltage.

ROTATE TRACK	SPEED SENSOR CONNECTOR (SENSOR SIDE)		VOLTAGE
	GN	BK	Alternate 12 Vdc and 0 Vdc



SENSOR SIGNAL VOLTAGE TEST

The signal voltage should alternate between approximately 12 Vdc and 0 Vdc.

NOTE: Since a pulsating voltage is measured, the numeric display will continuously change. The analog display may be easier to follow.

FLUKE
MULTIMETER
9.03
VDC
1
+
0
10
20
30
smr2005-056-010_a

TYPICAL
1. Analog display

If voltage is as specified, repair or replace wiring/connectors between sensor and speedometer.

If wiring/connectors are good, try a new speedometer.

If signal voltage is not as specified, try a new sensor.

FUEL LEVEL SENSOR

A float type fuel level sensor equipped with an in-line fuse (0.25 A) is used to provide a signal to the gauge for indication. Refer to *FUEL TANK AND FUEL PUMP* for sensor testing.

HEATED THROTTLE LEVER

System Description

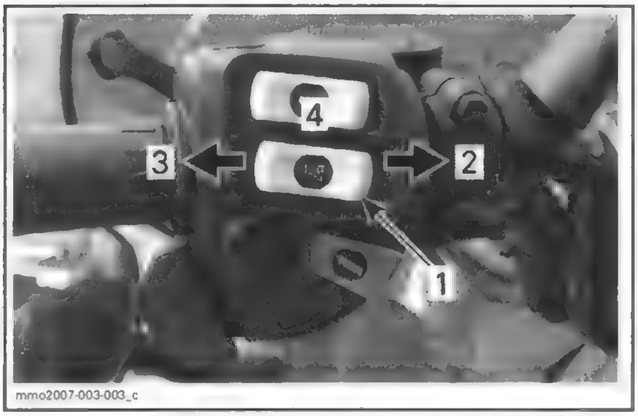
There are two types of throttle lever heating systems used on the REV XP platform.

The type of system used is determined by the gauge package installed at the factory, standard gauge or premium gauge.

Models with Standard Gauge

On vehicles equipped with a "Standard" gauge, the throttle lever heater is controlled by a toggle switch on the LH multifunction switch assembly.

The switch allows you to select **High**, center **Off**, and **Low** heat settings. The switch button will remain in the selected position until another selection is made.

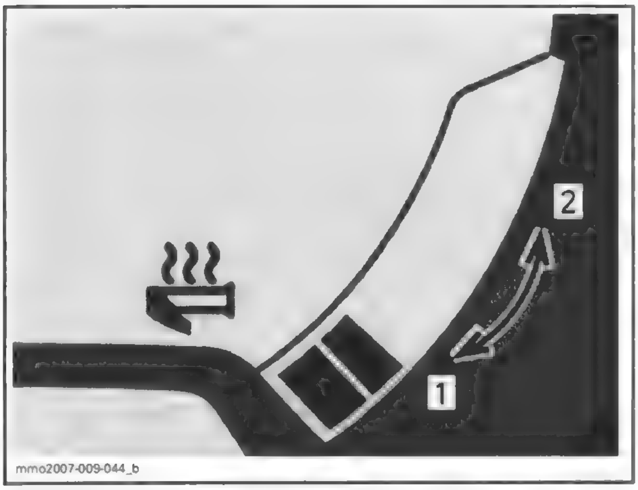


1. *Throttle lever heat switch*
2. *High*
3. *Low*
4. *Heat OFF (center position)*

Models with Premium Gauge

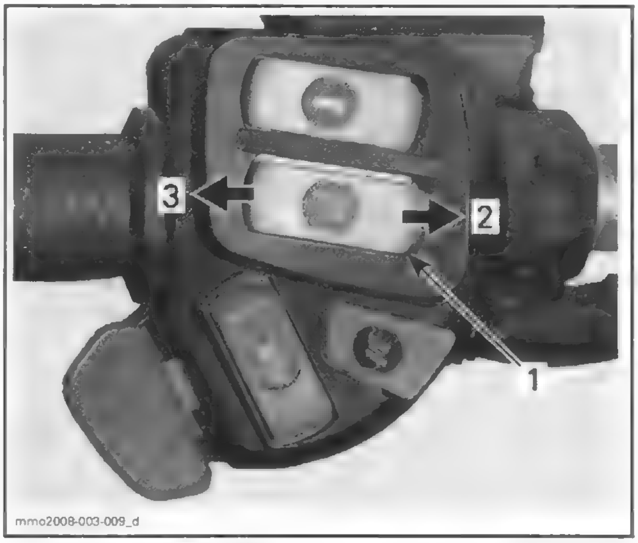
On vehicles factory equipped with a "Premium" gauge, the throttle lever heat is controlled through the gauge.

A three position switch on the LH multifunction switch assembly allows selection of 9 heat levels, which are displayed in the indicator.



THROTTLE LEVER HEAT INDICATOR
1. *Decrease heat*
2. *Increase heat*

The switch selection sends a signal to the premium gauge to increase or decrease heat.



1. *Throttle lever heat switch*
2. *Increase heat*
3. *Decrease heat*

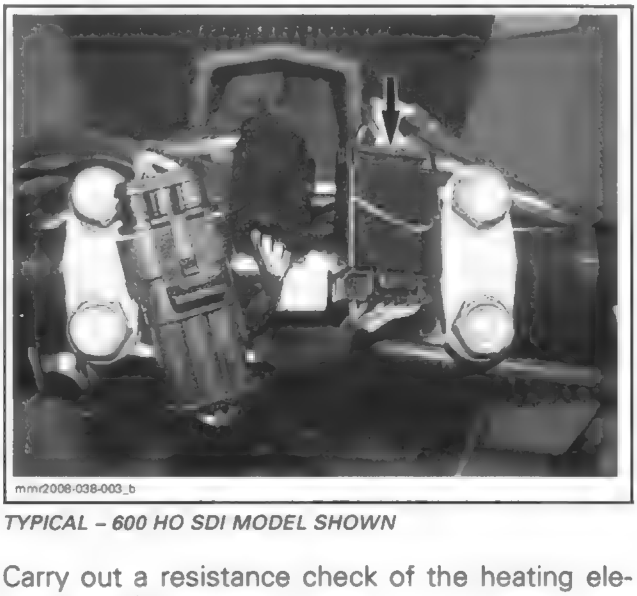
The gauge then applies the appropriate amount of current to the heater according to the selection.

To turn OFF the heaters, select heat down until there is no more indication on the bar graph.

When released, the switch springs back to the center neutral position.

Lever Heating Element Testing

Disconnect the RH steering connectors located under the steering cover.



TYPICAL – 600 HO SDI MODEL SHOWN

Carry out a resistance check of the heating elements as follows.

NOTE: Resistance values are measured at temperatures between 20°C and 30°C.

STANDARD GAUGE			
INTENSITY	ELEMENT TERMINAL		RESISTANCE
LOW	BR/YL	YL/BK	5.73 to 18.54 Ω
HIGH	BR		1.73 to 4.22 Ω

PREMIUM GAUGE		
ELEMENT TERMINAL		RESISTANCE
BR	YL/BK	1.73 to 4.2 Ω

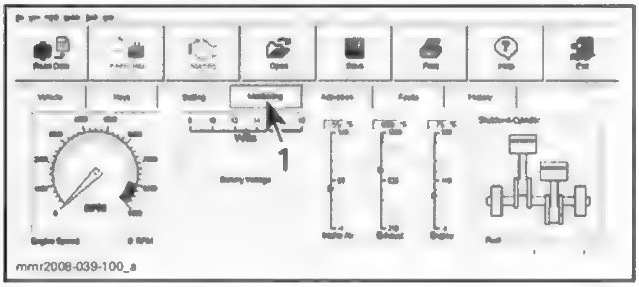
If readings are out of specifications, replace throttle lever.

If heating element readings are within specifications, carry out a switch continuity test. Refer to *WIRING DIAGRAMS* for wiring and connector details.

Reconnect connectors.

Heat Selector Switch Testing with B.U.D.S. (Premium gauge)

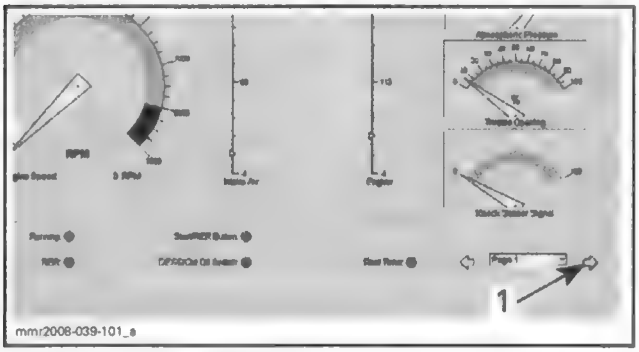
Using the B.U.D.S. software, select the **Monitoring** tab.


Monitoring
1

mmr2008-039-100_a

1. *Monitoring tab*

On the lower RH side of the **Monitoring** page, click on the arrow next to the box that says **Page 1** and select **Page 2**.

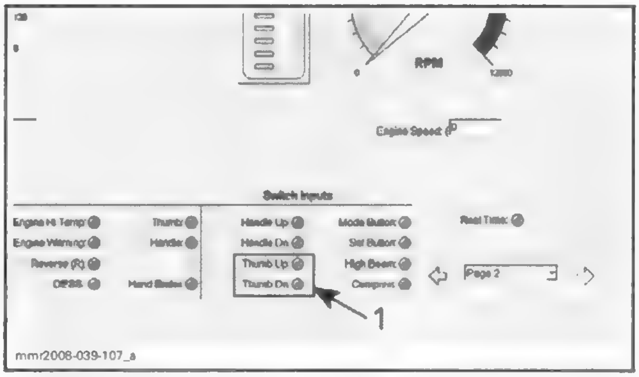


mmr2008-039-101_a

1. *Press here to select Page 2*

Press on the lever heat selector switch to alternately increase or decrease heat.

In B.U.D.S., look for the applicable indicator light in the **Switch inputs** box to turn green (Thumb Up or Thumb Dn). If they do, the heat selector switch for the throttle lever is functioning correctly.


RPM
Engine Speed
Switch Inputs
Engine Hi Temp
Engine Warning
Reverse (R)
Thumb
Handle
Hand Brake
Handle Up
Handle Dn
Thumb Up
Thumb Dn
Mode Button
Set Button
High Beam
Real Time
Page 2
1

mmr2008-039-107_a

1. *Indicator lights, throttle lever heat selection*

If the selector switch and the heater test good, replace the gauge.

HEATED HANDLEBAR GRIPS

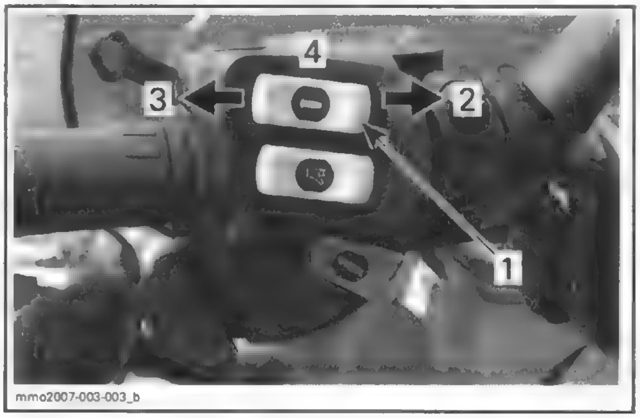
System Description

There are two types of grip heating systems used on the REV XP platform.

The type of system used is determined by the gauge package installed at the factory, standard gauge or premium gauge.

Models with Standard Gauge

On vehicles equipped with a "Standard" gauge, the grip heater is controlled by a toggle switch on the LH multifunction switch assembly.



mmo2007-003-003_b

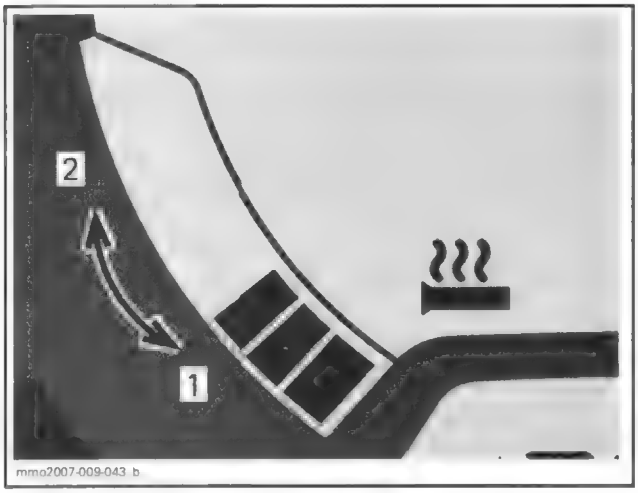
1. *Grip heat control switch*
2. *High*
3. *Low*
4. *Heat OFF (center position)*

The switch allows you to select **High**, center **Off**, and **Low** heat settings. The switch button will remain in the selected position until another selection is made.

Models with Premium Gauge

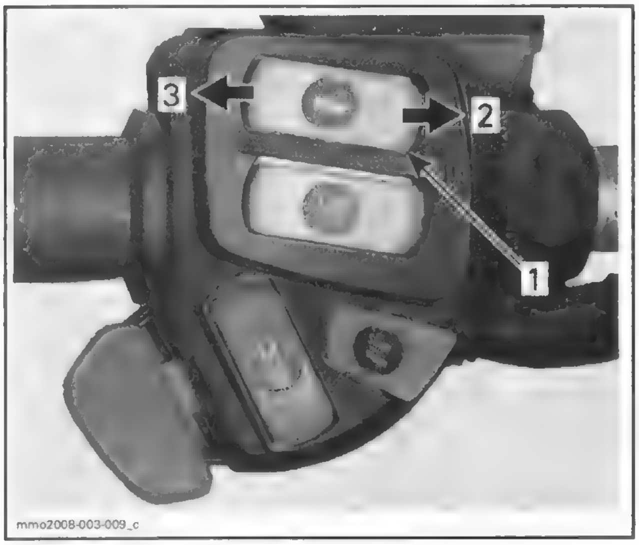
On vehicles factory equipped with a "Premium" gauge, the grip heat is controlled through the gauge.

A three position switch on the LH multifunction switch assembly allows selection of 9 heat levels, which are displayed in the indicator.



1. Decrease heat
2. Increase heat

The switch selection sends a signal to the premium gauge to increase or decrease heat.



1. Grip heat control switch
2. Increase heat
3. Decrease heat

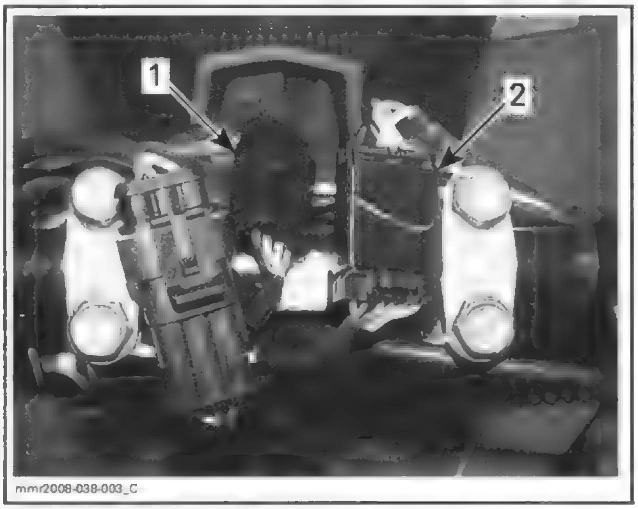
The gauge then applies the appropriate amount of current to the heater according to the selection.

To turn OFF the heaters, select heat down until there is no more indication on the bar graph.

When released, the switch springs back to the center neutral position.

Grip Heating Element Testing

Disconnect the two steering connectors located under the steering cover.



TYPICAL – 600 HO SDI MODEL SHOWN
1. LH steering connector
2. RH steering connector

Test heating elements on either side as follows.

NOTE: Resistance values are measured at temperatures between 20°C and 30°C.

STANDARD GAUGE			
INTENSITY	WIRE OF ELEMENT CONNECTOR		RESISTANCE
LOW	OR/VI	BK	10.71 to 13.09 Ω
HIGH	OR	BK	5.35 to 6.55 Ω

PREMIUM GAUGE		
ELEMENT TERMINAL		RESISTANCE
BR	YL/BK	1.73 to 4.2 Ω

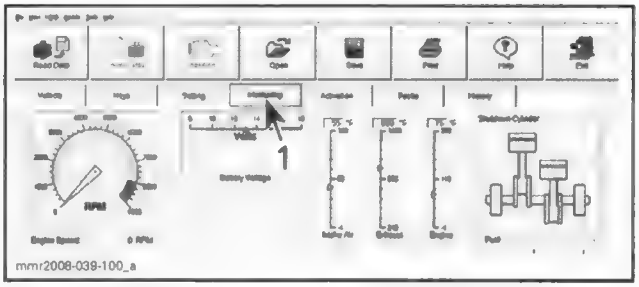
If readings are out of specifications, replace applicable handle grip/heating element.

If heating element readings are within specifications, carry out a switch continuity test. Refer to *WIRING DIAGRAMS* for wiring and connector details.

Reconnect connectors.

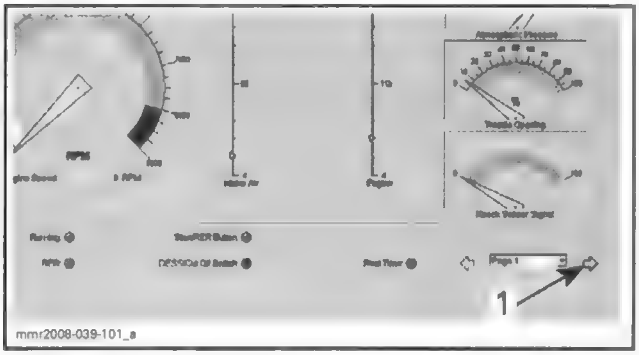
Heat Selector Switch Testing with B.U.D.S. (Premium Gauge)

Using the B.U.D.S. software, select the **Monitoring** tab.


1
mmr2008-039-100_a

1. *Monitoring tab*

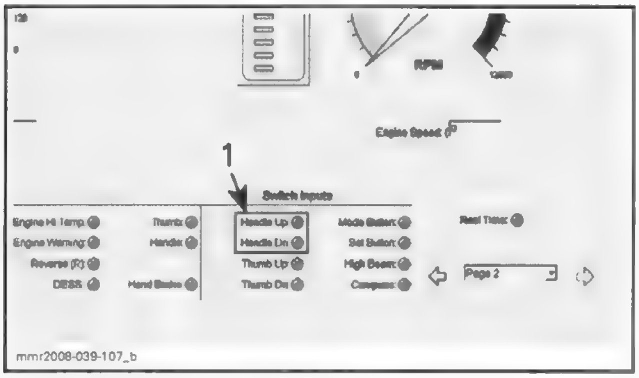
On the lower RH side of the monitoring page, click on the arrow next to the box that says **Page 1** and select **Page 2**.


RPM
Page 1
1
mmr2008-039-101_a

1. *Press here to select Page 2*

Press on the hand grip selector switch to alternately increase or decrease heat.

In B.U.D.S., look for the applicable indicator light in the **Switch inputs** box to turn green (Handle Up or Handle Dn). If they do, the heat selector switch for the hand grips is functioning correctly.


RPM
Engine Speed
1
Switch Inputs
Engine Hi Temp
Engine Warning
Reverse (R)
DESS
Thumb
Handle
Hand Brake
Handle Up
Handle Dn
Thumb Up
Thumb Dn
Mode Button
Set Button
High Beam
Compass
Real Time
Page 2
mmr2008-039-107_b

1. *Indicator lights, grip heat selection*

If the selector switch and the heaters test good, replace the gauge.

12-VOLT POWER OUTLET

Power Outlet Testing

First try another accessory, if it does not function, test outlet.

Remove console, refer to *BODY* section.

Unplug the power outlet connectors.

Apply power to the accessories circuits, see *LIGHTING AND ACCESSORIES SYSTEM TESTING* in this section.

Measure the voltage as follows.

WIRES		VOLTAGE
RD/YL	BK	Approximately 12 Vdc

If voltage reading is good, replace 12 Volt power outlet.

If you did not read any voltage, check the taillight. If it isn't functioning either, then test the following.

- Accessories fuse
- Accessories relay
- Connectors and wiring.

MODEL	ACCESSORIES FUSE	ACCESSORIES RELAY
500SS and 800R	FC	R1
600 HO SDI	F6	R3

Power Outlet Removal

Remove the console, refer to *BODY* section.

Remove connectors from the power outlet.

Unscrew the large nut then remove the power outlet.

Power Outlet Installation

The installation is the reverse of the removal procedure, refer to *BODY* section for console installation.

VISOR OUTLET

Visor Outlet Testing

First, try another accessory, if it does not function, test visor outlet.

Remove the console, refer to *BODY* section.

Unplug the visor connector.

Apply power to the accessories circuits, see *LIGHTING AND ACCESSORIES SYSTEM TESTING* in this section.

Check voltage as follows.

WIRES		VOLTAGE
RD/YL	BK	Approximately 12 Vdc

If voltage reading is good, replace visor outlet.

If you did not read any voltage, check the taillight. If it isn't functioning either, then test the following.

- Accessories fuse
- Accessory relay
- Wiring and connectors.

MODEL	ACCESSORIES FUSE	ACCESSORIES RELAY
500SS and 800R	FC	R1
600 HO SDI	F6	R3

Visor Outlet Removal

Remove the console, refer to *BODY* section.

Unplug the visor connector.

Unscrew visor outlet.

Visor Outlet Installation

The installation is the reverse of the removal procedure, refer to *BODY* section for console installation.

DRIVE BELT

SERVICE TOOLS

Description	Part Number	Page
belt tension tester	414 348 200	361
driven pulley opening tool	529 036 127	359–360

GENERAL

APPLICATION CHART

MODEL	DRIVE BELT (P/N)
500SS 600 HO SDI	417 300 197
800R	417 300 166

PROCEDURES

DRIVE BELT GUARD

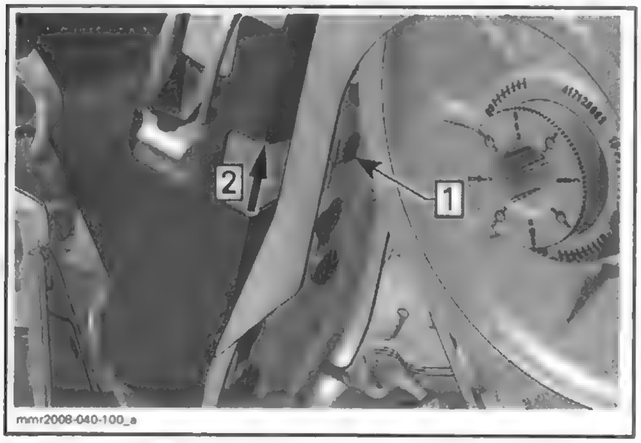
Drive Belt Guard Removal

⚠ WARNING

NEVER operate the snowmobile without belt guard securely installed.

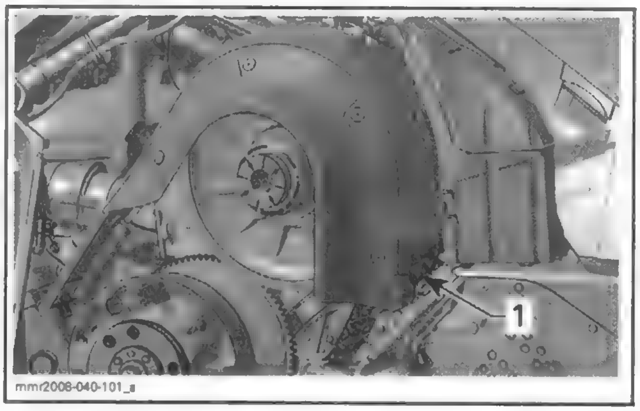
Open the LH side panel.

Remove the tool kit support by pressing the locking tab.



Step 1: Press tab
Step 2: Lift tool kit support

Remove retaining pin.

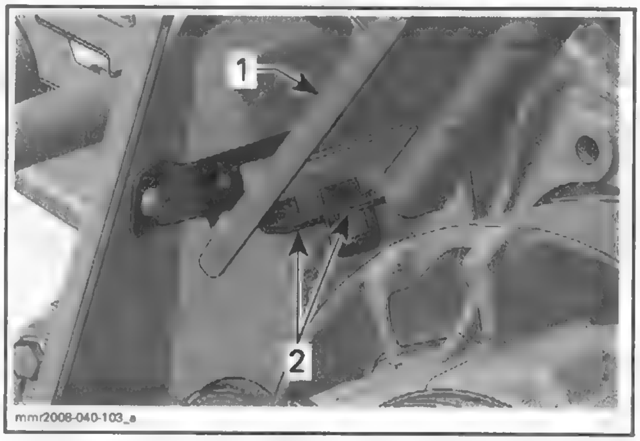


1. Retaining pin

Lift rear portion of guard then release from front tabs.

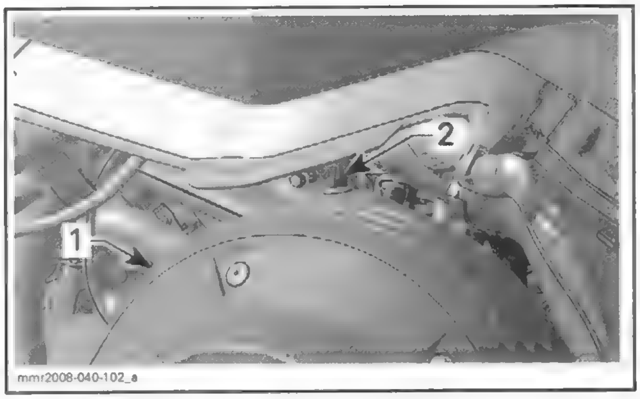
Drive Belt Guard Installation

Place belt guard slots over tabs.



1. Belt guard
2. Tabs

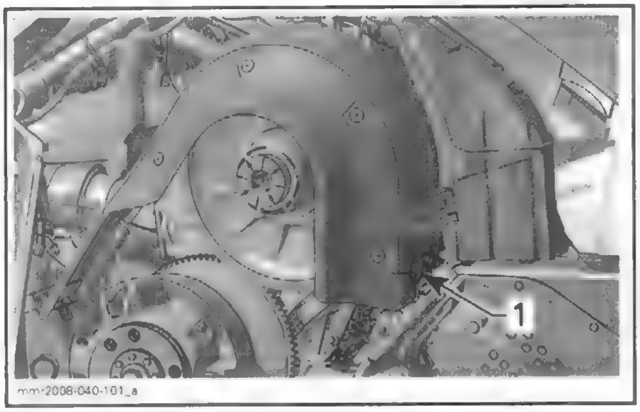
Position top portion of belt guard over retaining pin.



1. *Belt guard*
2. *Retaining pin*

CAUTION: Do not pry retaining pin excessively to avoid breaking it.

Secure belt guard using retaining pin.



1. *Retaining pin*

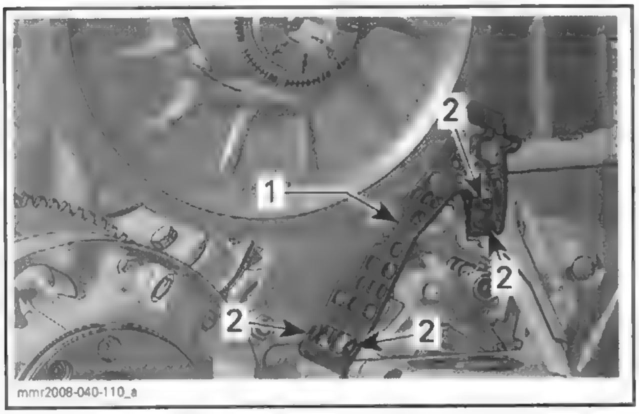
Install the tool kit support.

DRIVE BELT GUARD SUPPORT

Guard Support Removal

Remove *DRIVE BELT GUARD*, see procedure above.

Remove screws securing the support to vehicle.



1. *Drive belt guard support*
2. *Screws*

Guard Support Installation

The installation is the reverse of the removal procedure.

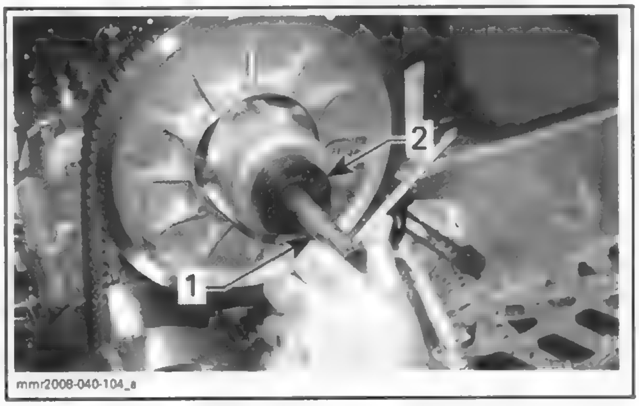
Tighten screws to 5 N•m (44 lbf•**in**).

DRIVE BELT

Drive Belt Removal

Remove the *BELT GUARD*, see procedure above.

Using the spark plug tool (included in the tool kit) or an 11/16 in thin wall socket, loosen (± 4 turns) the adjustment ring adapter located inside adjustment ring.

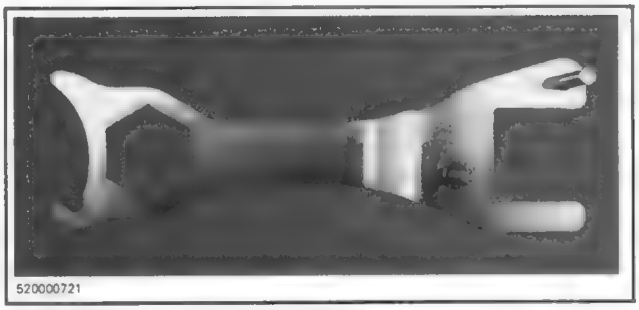


1. *Spark plug tool*
2. *Driven pulley adjustment ring*

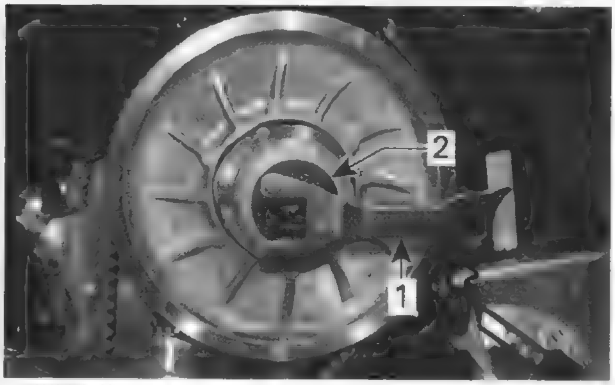
To open the driven pulley, proceed as follows with one of the following tools.

Suspension Adjustment Tool

Using the suspension adjustment tool (included in the tool kit), open the driven pulley by turning the tool clockwise.



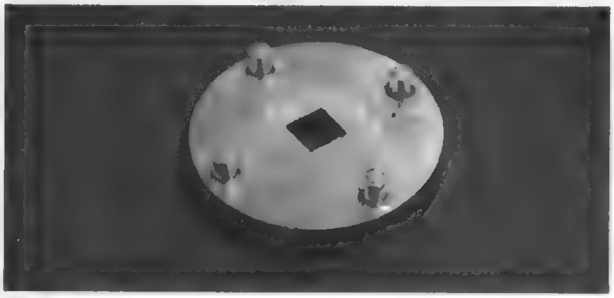
SUSPENSION ADJUSTMENT TOOL



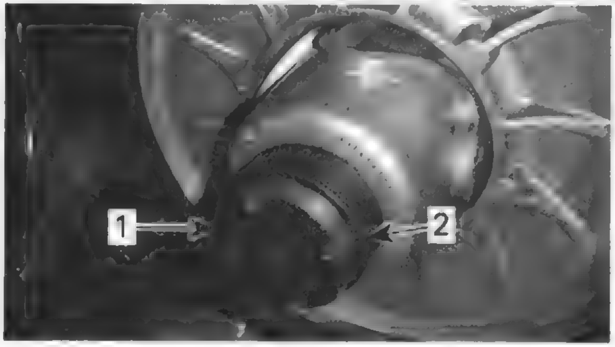
1. *Suspension adjustment tool*
2. *Driven pulley adjustment ring*

Driven Pulley Opening Tool

Using the driven pulley opening tool (P/N 529 036 127), open the driven pulley by turning the tool clockwise.



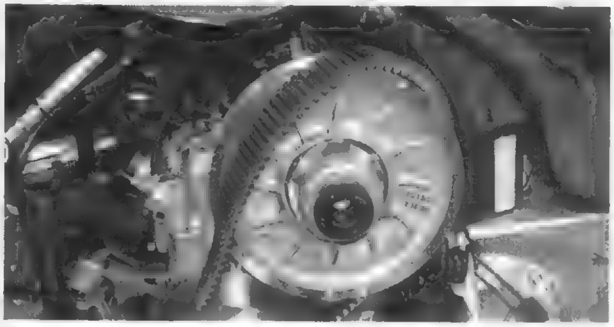
DRIVEN PULLEY OPENING TOOL (P/N 529 036 127)



1. *Driven pulley opening tool*
2. *Driven pulley adjustment ring*

Belt Removal

To remove belt, slip the belt over the top of driven pulley.



Drive Belt Inspection

Inspect belt for:

- Cracks
- Fraying
- Abnormal wear (uneven wear, wear on one side, missing cogs, cracked fabric).

If abnormal wear is noted, probable cause could be:

- Pulley misalignment
- Excessive RPM with frozen track
- Fast starts without warm-up period
- Scratched or rusty sheave
- Oil on belt
- Distorted spare belt.

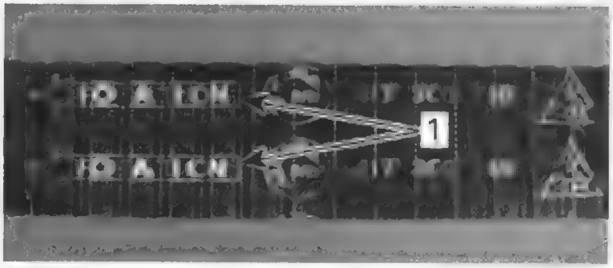
Check drive belt width. Replace the drive belt if width is under minimum recommended width.

MODEL	MINIMUM WIDTH (wear limit)
500SS 600 HO SDI	34.9 mm (1-3/8 in)
800R	35.3 mm (1-13/32 in)

Drive Belt Installation

Install drive belt.

NOTE: The maximum drive belt life span is obtained when the arrows on the drive belt are directed toward the front of vehicle. This will ensure that correct direction of rotation is respected.

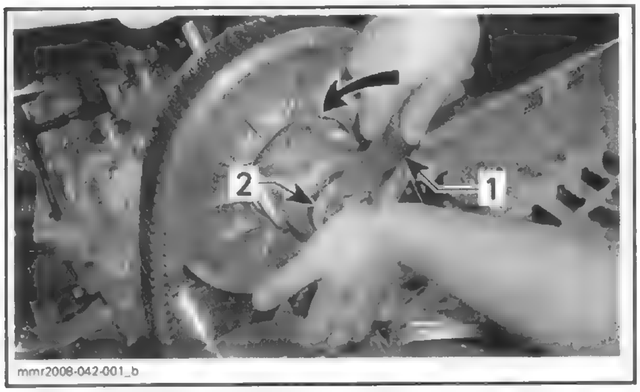


1. *Arrows pointing the front of vehicle*

Adjust drive belt height.

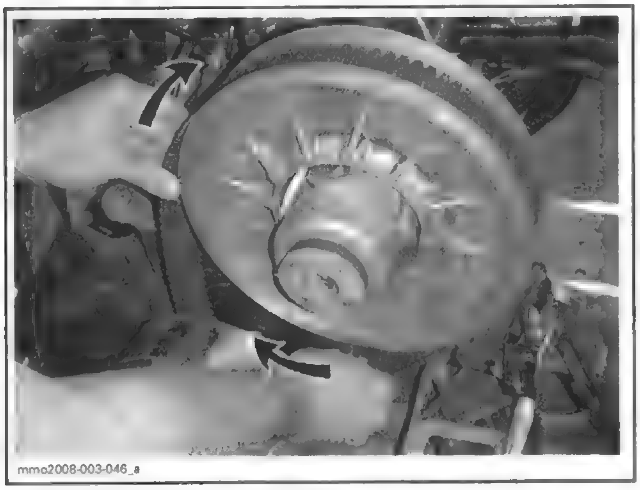
Drive Belt Height Adjustment

Using the suspension adjustment tool or the driven pulley opening tool (P/N 529 036 127), turn the driven pulley adjuster counterclockwise (± 1 turn).



1. Suspension adjustment tool
2. Adjustment ring

Manually rotate drive belt to position it properly inside pulley sheaves.



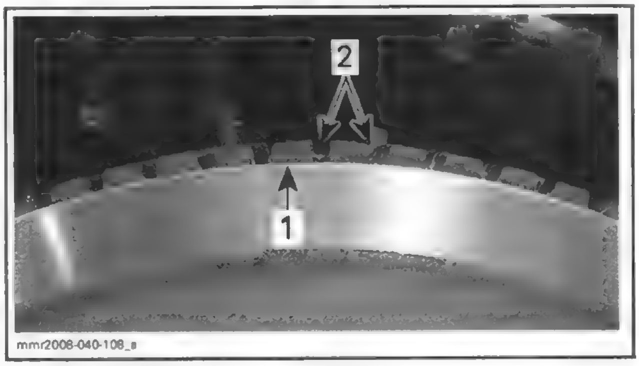
MANUALLY ROTATE DRIVE BELT

500SS/600 HO SDI

Repeat until drive belt reaches its highest position between pulley sheaves.

800R

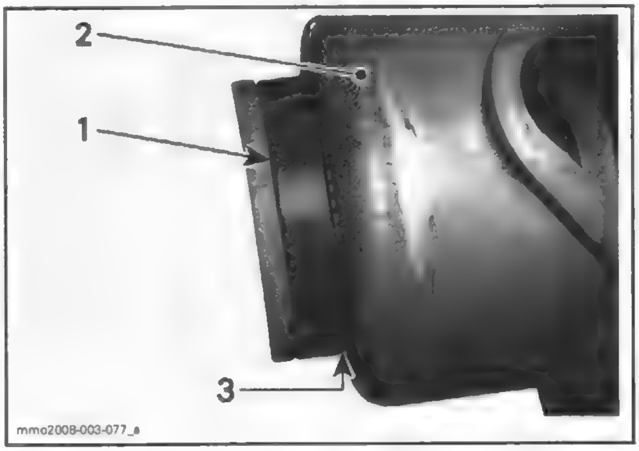
Repeat until the bottom of grooves on the external side of drive belt reach the driven pulley edges.



1. Driven pulley edge
2. External drive belt grooves

All Models

When the drive belt is properly positioned, ensure that the swivel ring leans against the driven pulley cam.

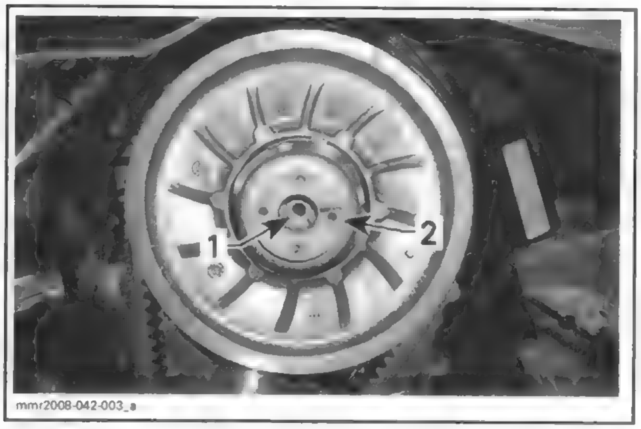


1. Swivel ring
2. Driven pulley cam
3. In contact with driven pulley

CAUTION: Overtightening swivel ring will modify drive belt adjustment and reduce drive belt life span.

Check drive belt deflection. See procedure further.

Using the spark plug tool (included in the tool kit) or an 11/16 in thin wall socket, snug up the locking nut (± 4 turns).



1. Locking nut
2. Adjustment ring

Reinstall belt guard.

Close LH side panel.

Drive Belt Deflection Verification

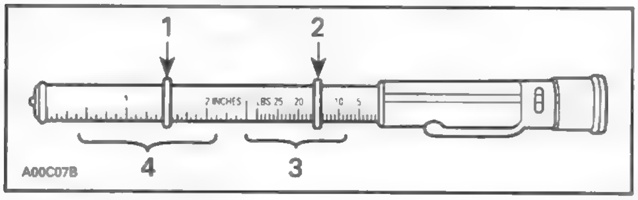
To adjust drive belt correctly and obtain maximum vehicle performance, it is recommended to perform the following steps in this order:

NOTE: Belt tension must be adjusted after the break-in period (i.e. after 50 km (30 miles)).

1. Install a proper drive belt, see *APPLICATION CHART* at the beginning of this section.
2. Adjust drive belt height, see procedure in *DRIVE BELT INSTALLATION.*
3. Check drive belt deflection using the following procedure.

Position a reference rule on drive belt.

Use the belt tension tester (P/N 414 348 200) as explained below.

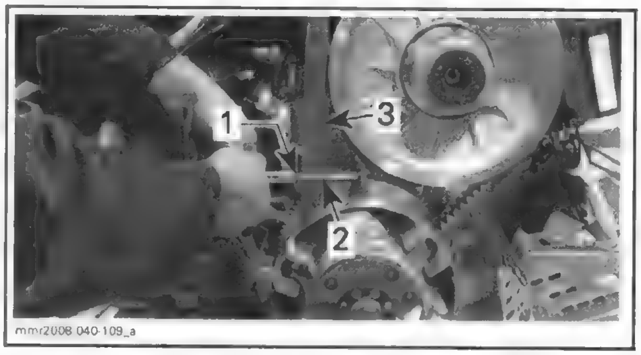


1. Lower O-ring
2. Upper O-ring
3. Force (read down)
4. Deflection (read up)

Slide lower O-ring of deflection scale to specified measure.

Slide upper O-ring to 0 (zero) on the force scale.

Apply pressure until lower O-ring is flush with edge of rule and read force on the upper scale at top edge of O-ring.



1. Upper O-ring — force
2. Lower O-ring — deflection
3. Reference rule

MODEL	DEFLECTION mm (in)	FORCE kg (lb)
500SS 600 HO SDI 800R	32 ± 5 (1.260 ± .197)	11.3 (25)

If the deflection is within specifications, drive belt adjustment is completed.

If the deflection is out of specifications, reposition drive belt. See *DRIVE BELT HEIGHT ADJUSTMENT* procedure in this section.

Recheck deflection.

If specification cannot be reached, try a new drive belt.

DRIVE PULLEY

SERVICE TOOLS

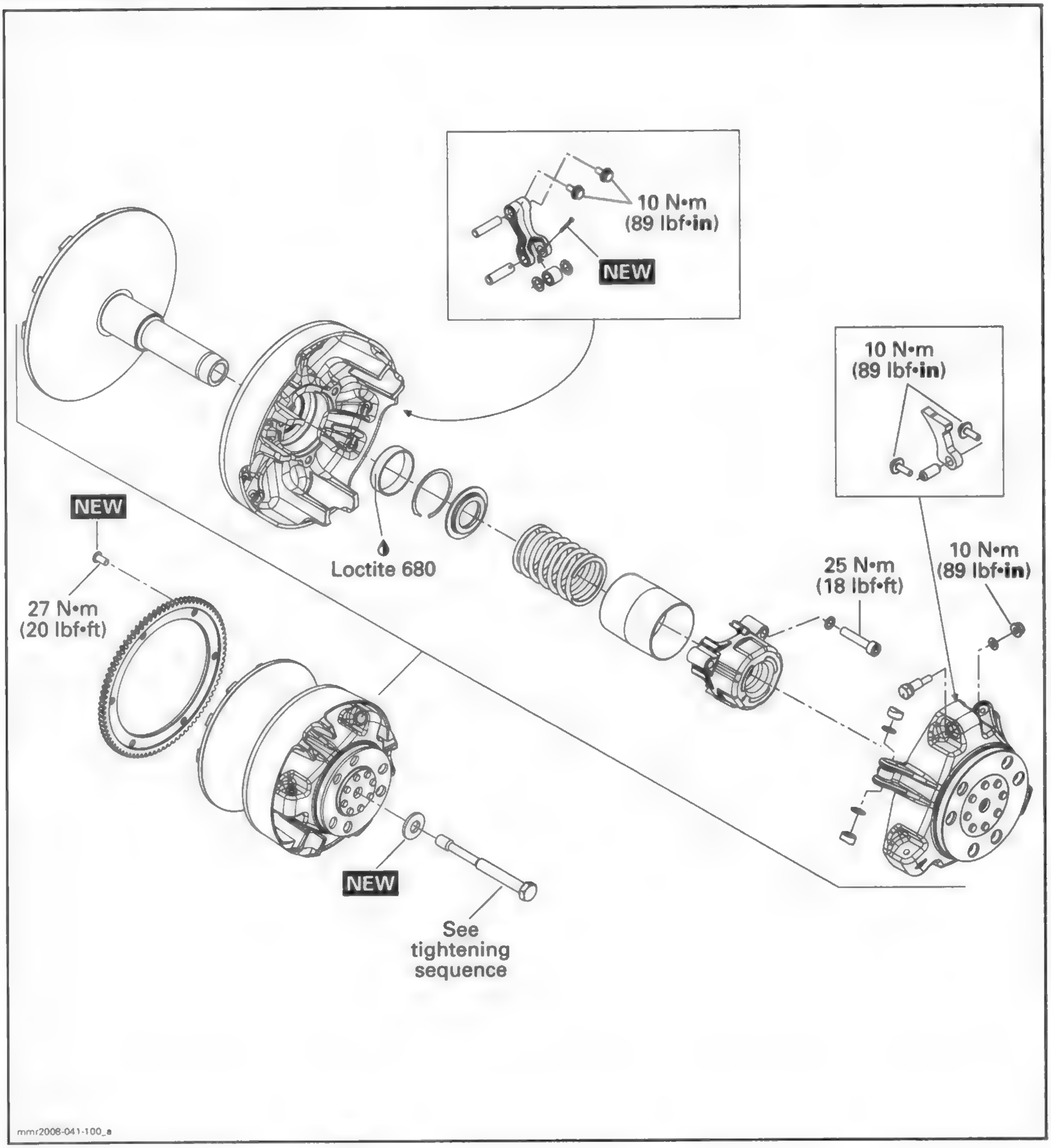
Description	Part Number	Page
slider shoe fork	529 005 500	367, 373
drive pulley puller	529 022 400	366
bushing remover/installer	529 031 200	370
drive pulley holder	529 035 674	366–367, 375
sliding sheave bushing remover/installer	529 035 931	370, 372
spring compressor	529 036 012	368, 370, 372–373

SERVICE PRODUCTS

Description	Part Number	Page
Loctite 680	293 800 114	372
pulley flange cleaner	413 711 809	370

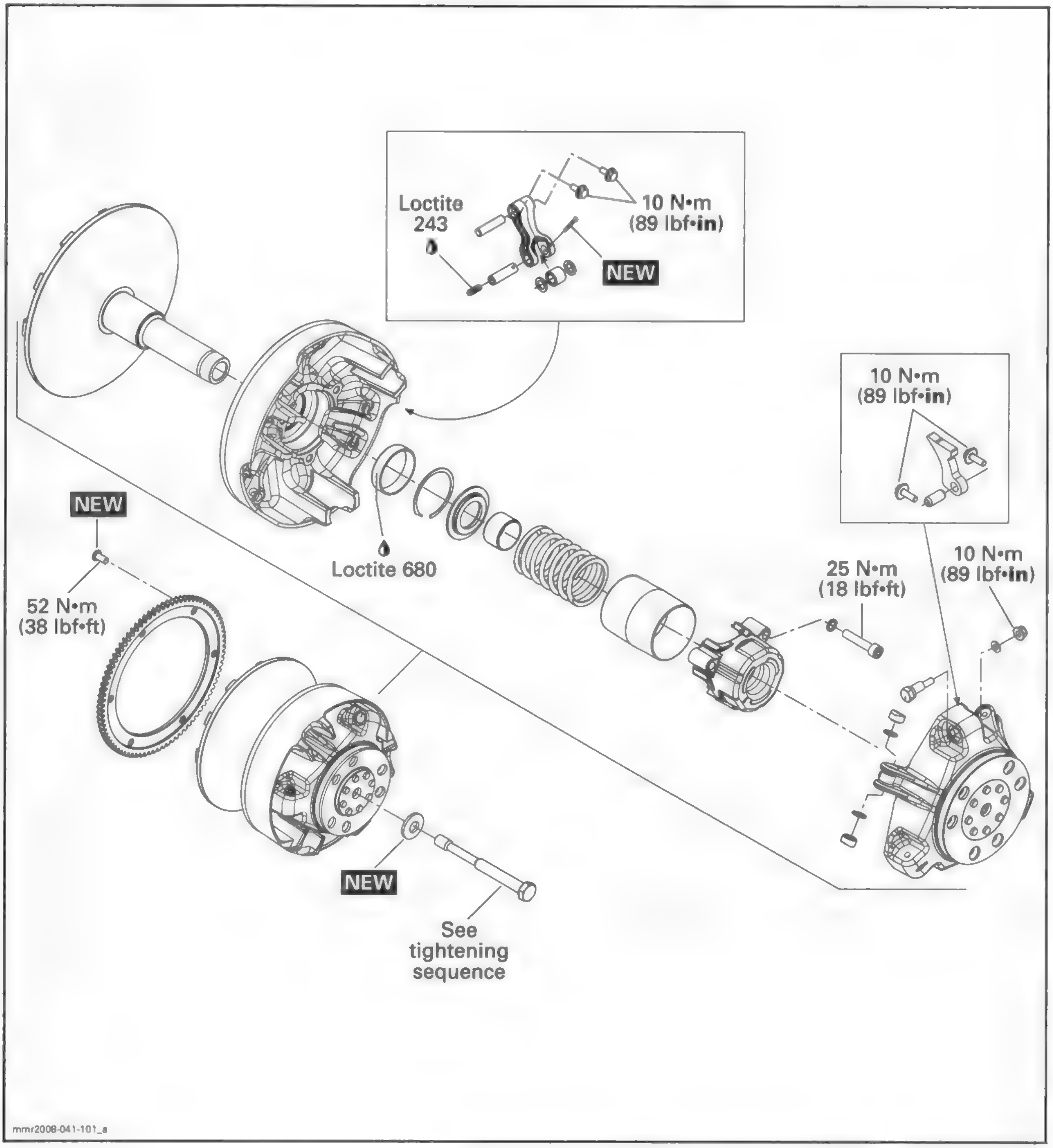
TRA III

500SS and 600 HO SDI


10 N•m
(89 lbf•in)
NEW
10 N•m
(89 lbf•in)
NEW
Loctite 680
25 N•m
(18 lbf•ft)
10 N•m
(89 lbf•in)
27 N•m
(20 lbf•ft)
NEW
See
tightening
sequence
mmr2008-041-100_a

TRA VII

800R


Loctite
243
10 N•m
(89 lbf•**in**)
NEW
10 N•m
(89 lbf•**in**)
NEW
Loctite 680
52 N•m
(38 lbf•ft)
25 N•m
(18 lbf•ft)
10 N•m
(89 lbf•**in**)
NEW
See
tightening
sequence
mmr2008-041-101_a

GENERAL

TRA drive pulley stands for **Total Range Adjustable** drive pulley.

These are lubrication free drive pulleys. Do not lubricate any component.

Always refer to appropriate *PARTS CATALOG* for replacement part.

Most parts of TRA III are not interchangeable with those of the TRA VII.

CAUTION: Never use any type of impact wrench at drive pulley removal and installation. The use of impact wrench could damage the drive pulley and modify the calibration.

Some drive pulley components (return spring, ramp) can be changed to improve vehicle performance in high altitude regions. A Service Bulletin gives information about calibration according to altitude.

CAUTION: Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance. Verify spring specifications before installation. Do not only refer to the spring color code.

⚠ WARNING

Any drive pulley repairs must be performed by an authorized Ski-Doo dealer. Subcomponent installation and assembly tolerances require strict adherence to procedures detailed.

During assembly/installation, use torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pins, etc.) must be replaced with new ones.

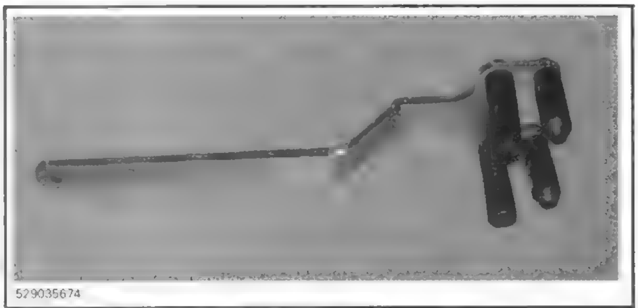
PROCEDURES

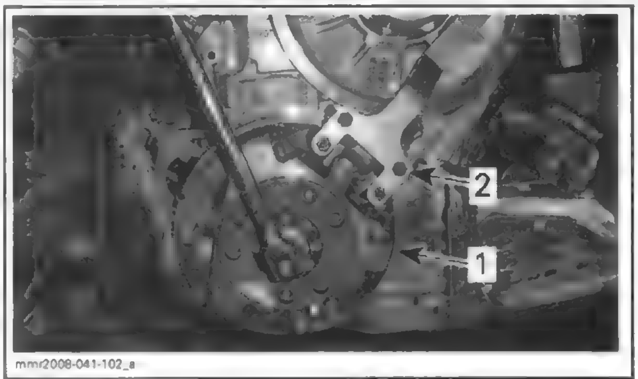
DRIVE PULLEY

Drive Pulley Removal

Remove drive belt. Refer to *DRIVE BELT* section.

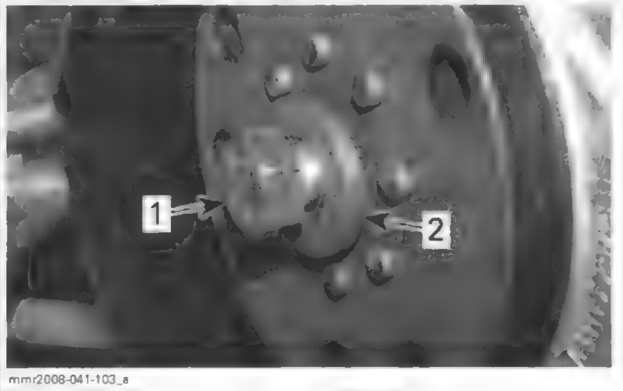
Secure drive pulley with the drive pulley holder (P/N 529 035 674). Install it over a sliding sheave tower.





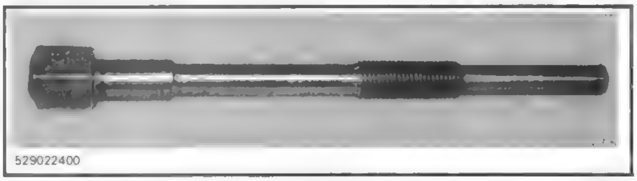
1. *Drive pulley*
2. *Drive pulley holder*

Remove the drive pulley bolt and its conical spring washer.

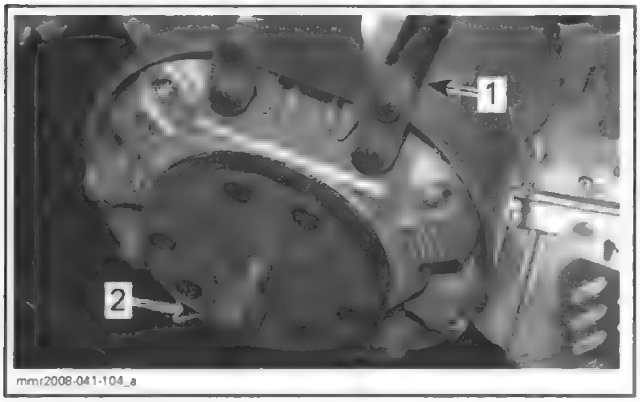


1. *Drive pulley bolt*
2. *Conical spring washer*

To remove drive pulley from engine, use the drive pulley puller (P/N 529 022 400).



Retain drive pulley with the drive pulley holder (P/N 529 035 674), and install the puller in pulley shaft then tighten.



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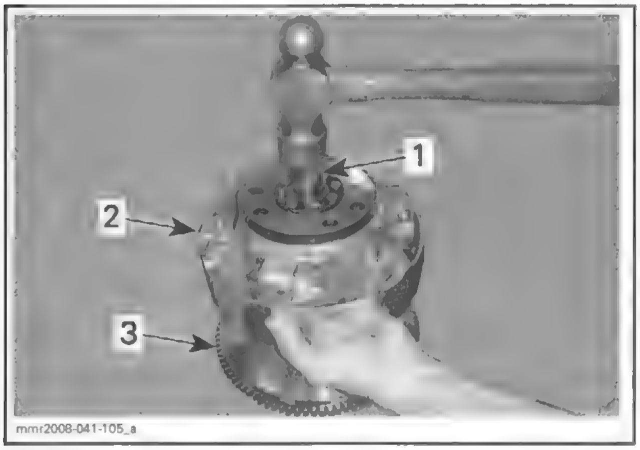
1. *Drive pulley holder*
2. *Drive pulley puller*

CAUTION: These pulleys have metric threads. Do not use imperial threads puller. Always tighten puller by hand to ensure that the drive pulley has the same type of threads (metric vs imperial) prior to fully tightening.

Drive Pulley Disassembly

CAUTION: NEVER tap on governor cup.

To separate fixed sheave from sliding sheave, screw puller into fixed sheave shaft about 13 mm (1/2 in). Raise drive pulley and hold it by the sliding sheave while knocking on puller head to disengage fixed sheave.



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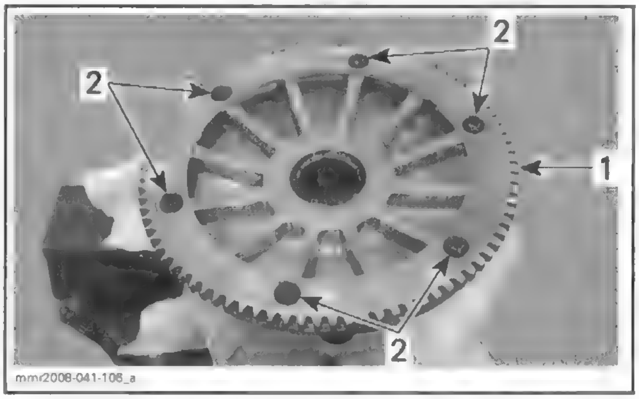
TYPICAL
1. *Puller*
2. *Sliding sheave*
3. *Fixed sheave*

NOTE: No components marking is required before disassembling this drive pulley since it has factory mark and arrows as indexing reference.

Ring Gear

To remove the ring gear, use a heat gun to break the threadlocker on ring gear screws. Discard the ring gear screws.



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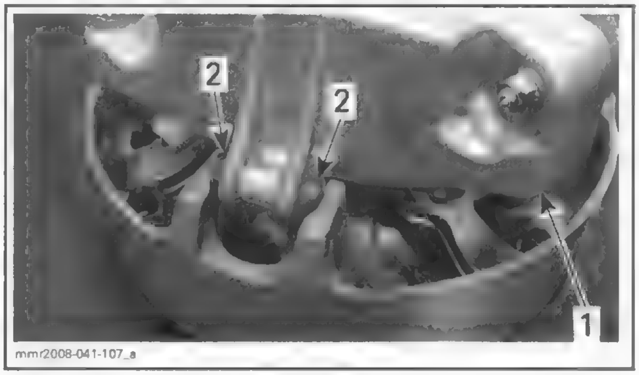
1. *Ring gear*
2. *Ring gear screws*

CAUTION: If another tool than a heat gun is used, do not exceed 150°C (300°F).

Slider Shoes and Governor Cup

Carefully lift governor cup until slider shoes come at their highest position into guides.



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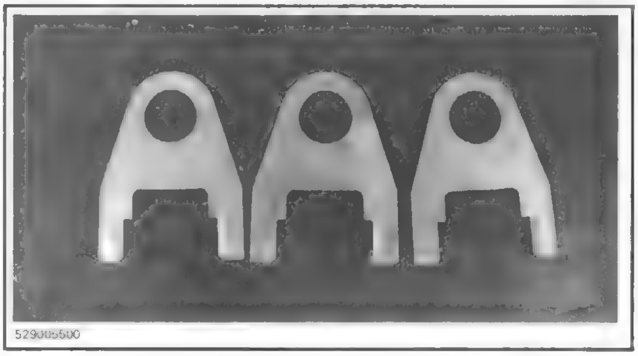
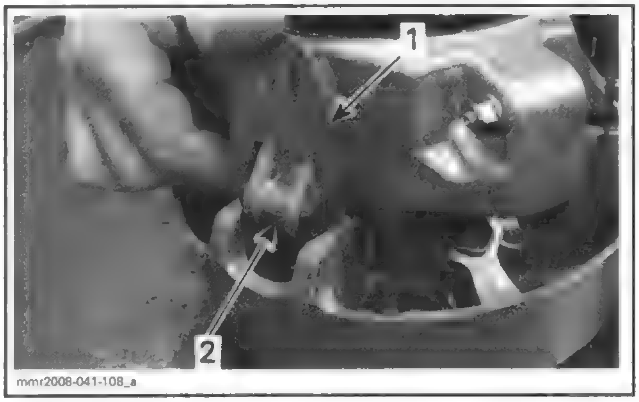
1. *Governor cup*
2. *Slider shoes*

Hold a slider shoe set then carefully lift its housing and install a slider shoe fork (P/N 529 005 500). Proceed the same way for other housings lifting one at a time.

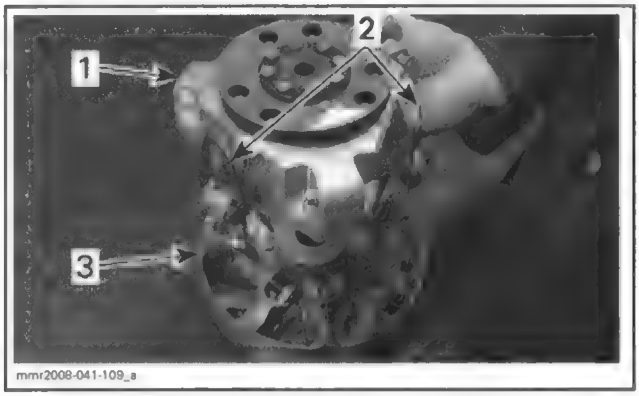


529005500



1. *Governor cup*
2. *Slider shoe forks*

When all slider shoes are held with the forks, remove the governor cup.



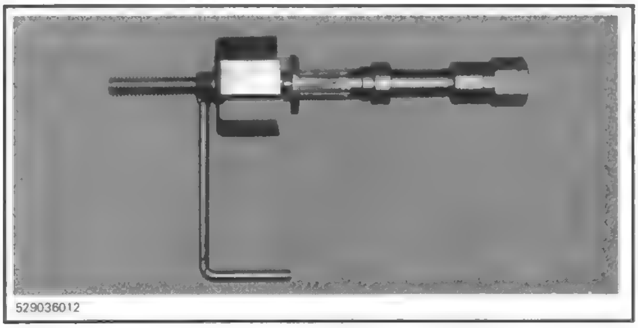
1. *Governor cup*
2. *Slider shoe forks*
3. *Sliding sheave*

Spring Cover

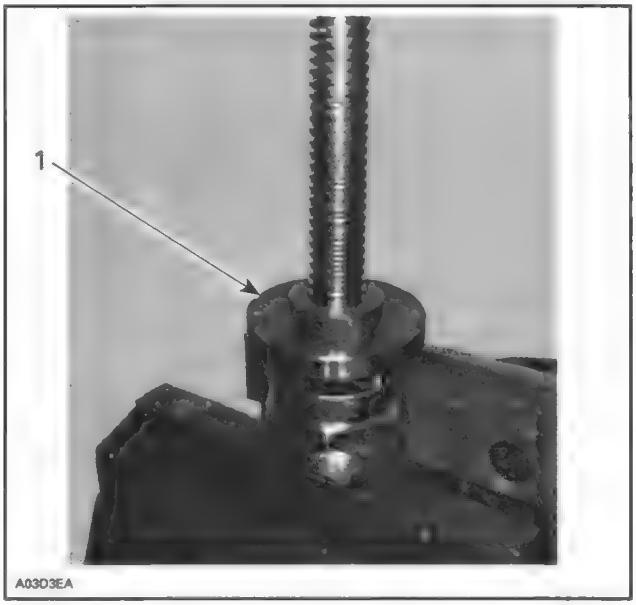
To remove the spring cover, always use the spring compressor (P/N 529 036 012). The spring cover is under high clutch spring preload.

⚠ WARNING

Clutch spring is very strong. Never attempt to remove spring cover without the recommended tools.



Install support guide of spring compressor in a vice.

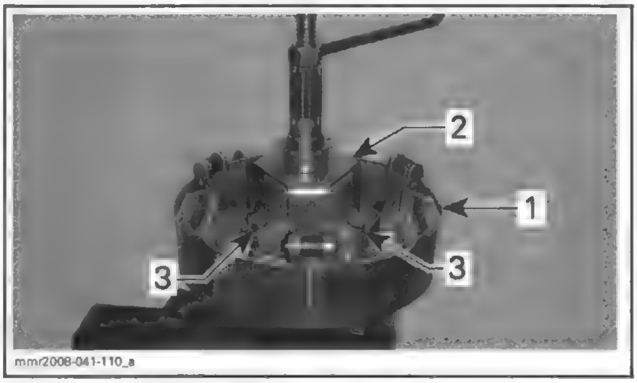


1. *Support guide*

NOTE: The support guide will prevent bushing damages.

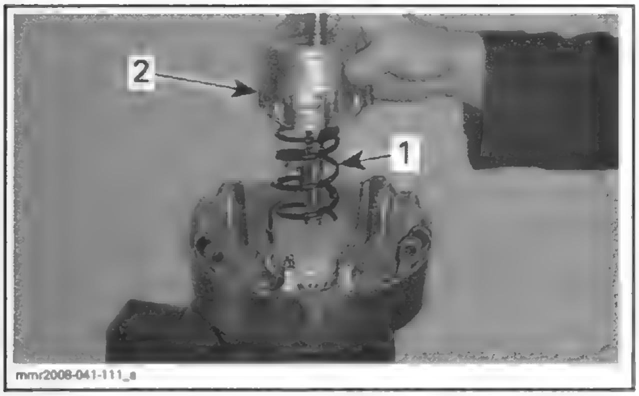
Install sliding sheave then the support cup over spring cover.

Remove 3 Allen screws retaining spring cover then unscrew compressor.



TYPICAL — TRA VII SHOWN
1. *Sliding sheave*
2. *Support cup*
3. *Spring cover screws*

Remove spring cover, spring and spring seat.


2
1
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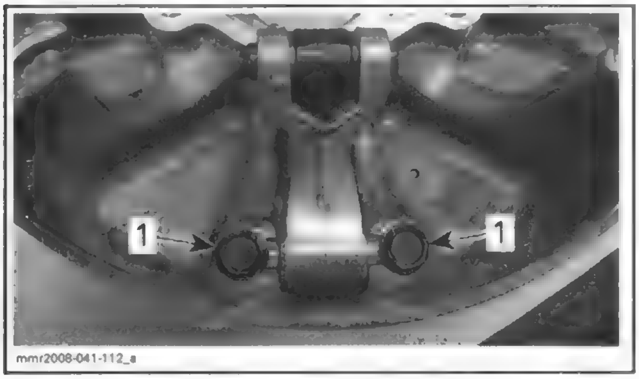
1. *Spring*
2. *Spring cover*

Lever, Roller and Pin

Remove lever screws.


1
1
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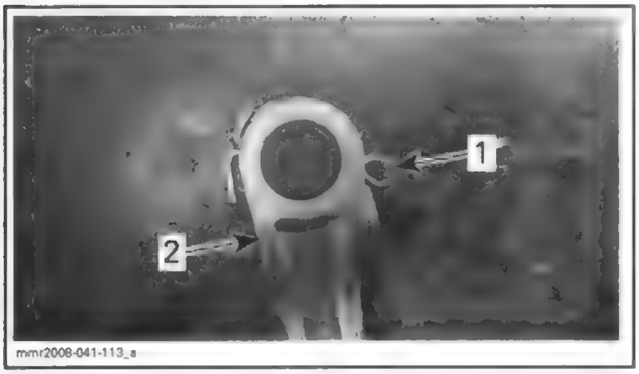
1. *Lever screws*

Pull lever to remove it from sliding sheave.

Remove and discard the cotter pin.


1
2
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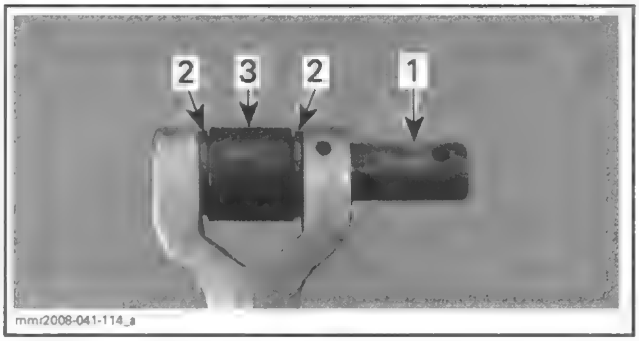
1. *Cotter pin*
2. *Lever*

Remove pin, thrust washers and roller.


2
3
2
1
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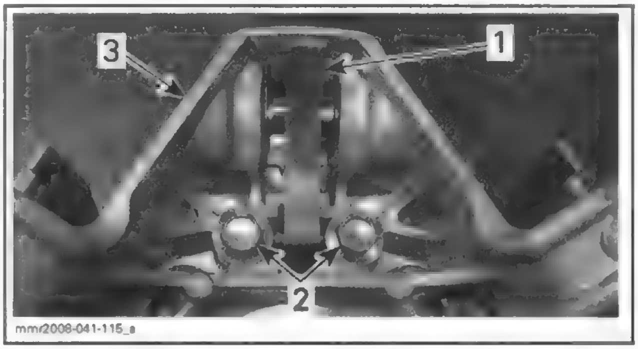
1. *Pin*
2. *Thrust washers*
3. *Roller*

Ramp

Turn the governor cup up side down.

Remove screws retaining ramp to governor cup.


3
1
2
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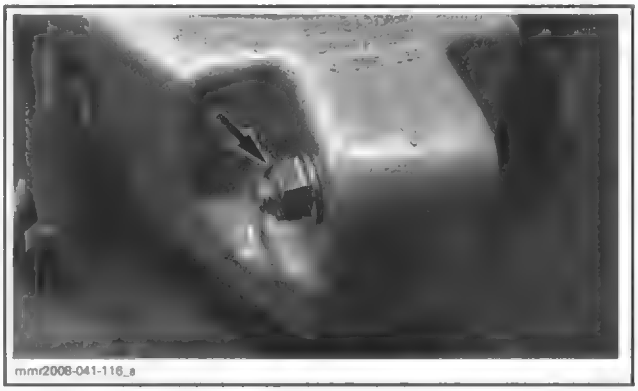
1. *Ramp*
2. *Ramp screws*
3. *Governor cup*

Calibration Screw

Unscrew the nut securing the calibration screw.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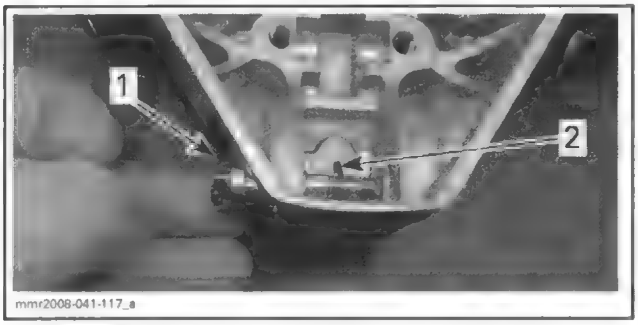
Remove calibration screw and its washer.



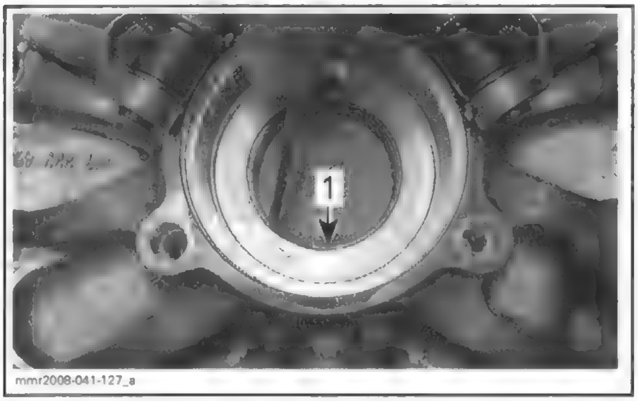
1. *Calibration screw*
2. *Washer*

Sliding Sheave Bushing Removal

NOTE: In case of worn out bushing, it is advisable to replace whole sliding sheave assembly as replacing just the bushing may reduce the drive pulley performance.

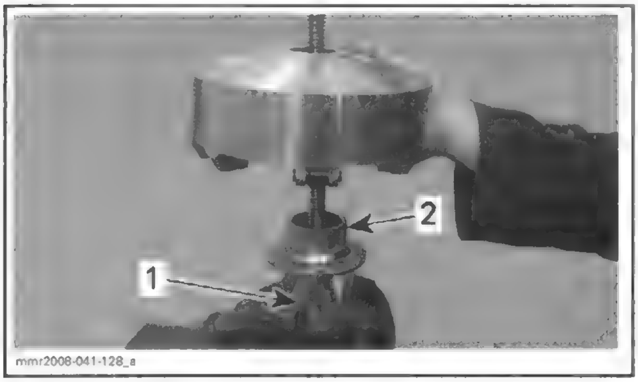
If bushing is out of specifications, remove it as follows:

- Remove circlip from the sliding sheave.



1. *Circlip*

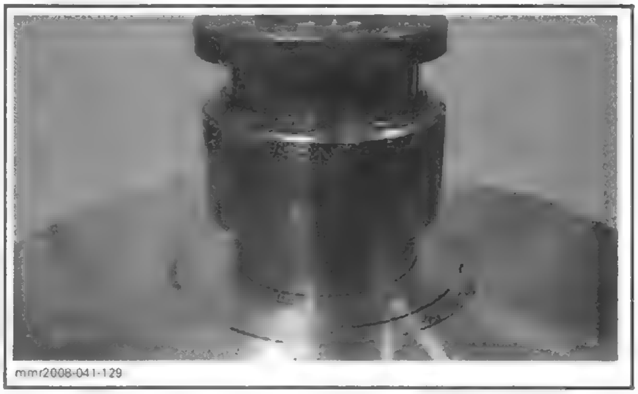
- Secure the spring compressor (P/N 529 036 012) in a vice.
- Mount the bushing remover/installer (P/N 529 031 200) and the sliding sheave assembly on it.



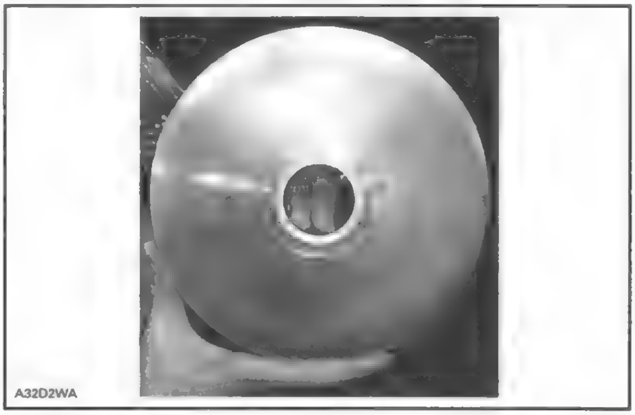
1. *Spring compressor*
2. *Bushing remover/installer*

- Use the sliding sheave bushing remover/installer (P/N 529 035 931) to press out old bushing.

NOTE: Make sure to use the tool as marked; to remove the bushing press using the side marked "OUT", as shown below in the picture.



- Use a soft sand paper to clean sliding sheave bushing mounting surface.



- Clean sliding sheave bushing mounting surface with pulley flange cleaner (P/N 413 711 809).
- Clean the circlip groove.

Drive Pulley Cleaning

Parts must be at room temperature before cleaning.

Clean pulley sheaves and shaft with fine steel wool and dry cloth.

Using a paper towel with pulley flange cleaner (P/N 413 711 809), clean crankshaft tapered end and the taper inside the fixed sheave of the drive pulley, crankshaft threads and retaining screw threads.

CAUTION: Avoid contact between cleaner and crankshaft seal because damage may occur.

Remove all hardened oil deposits that have baked on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper no. 600.

CAUTION: Do not use any other type of abrasive.

Reclean mounting surfaces with paper towel and cleaning solvent.

Wipe off the mounting surfaces with a clean, dry paper towel.

CAUTION: Mounting surfaces must be free of any oil, cleaner or towel residue.

Drive Pulley Inspection

NOTE: During inspection, replace any component if found defective or out of specifications.

Fixed Sheave and Governor Cup

Inspect fixed sheave for marks or scratches.

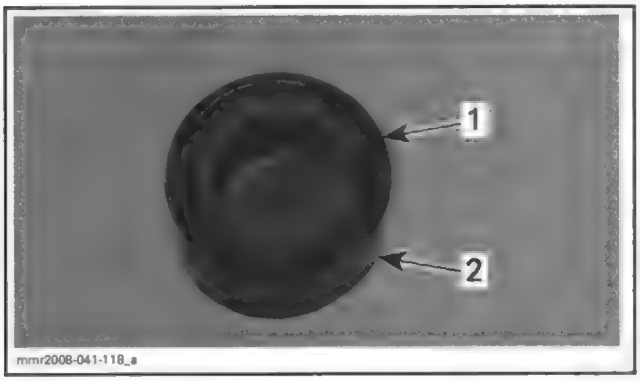
500SS and 600 HO SDI

Inspect splines and free play between both parts. Maximum free play is 0.5 mm (.020 in) measured at calibration screw radius.

Slider Shoes

Check slider shoes for wear. Replace if groove is not apparent on top.

Check if slider shoe O-rings are cracked, cut or crushed.



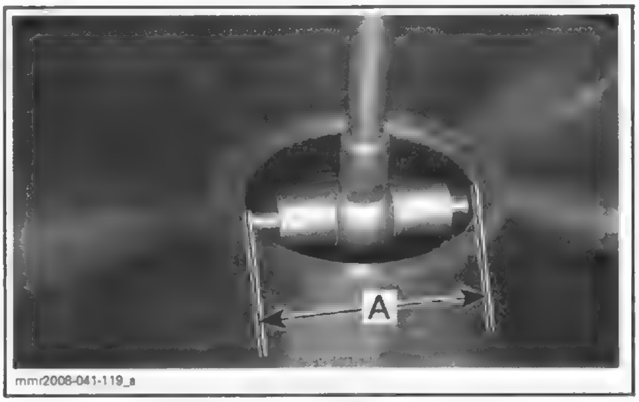
1. *O-ring*
2. *Slider shoe*

Sliding Sheave

Inspect pulley sheave for marks or scratches.

Visually inspect coating of bushings.

Using a bore gauge, measure the inner diameter of sliding sheave bushing. Measuring point must be at least 5 mm (1/4 in) from bushing edge.



A. *Inner diameter of sliding sheave bushing*

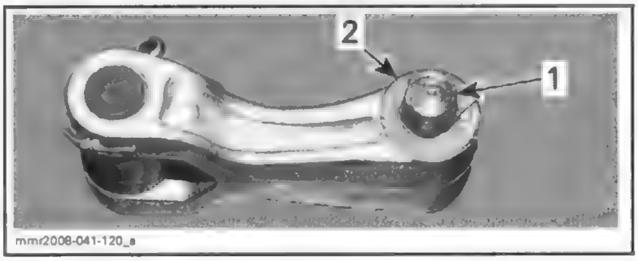
BUSHING	SERVICE LIMIT
Sliding sheave bushing	40.30 mm (1.587 in)

Lever, Roller and Pin

Check levers for cracks, distortion or other damages.

Check lever pivot for wear.

Check lever flanged bushing for wear.



1. *Lever pivot*
2. *Lever flanged bushing*

Check rollers for roundness of external diameter.

Check thrust washers for thickness wear.

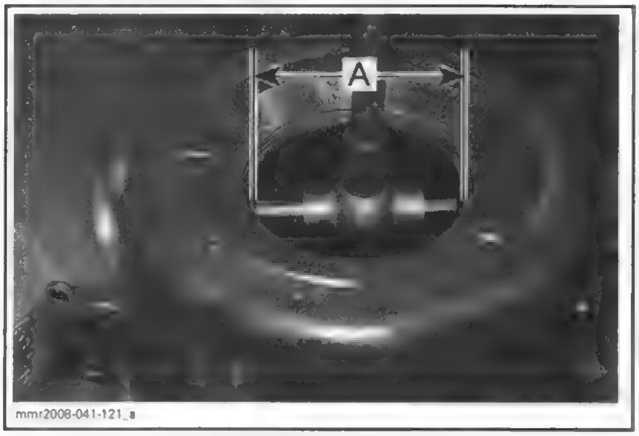
Check roller pins for wear.

Spring Cover

Check spring cover for cracks or wear.

Visually inspect the coating of spring cover bushing for wear.

Using a bore gauge, measure the inner diameter of spring cover bushing. Measuring point must be at least 5 mm (1/4 in) from bushing edge.



A. Inner diameter of spring cover bushing

BUSHING	SERVICE LIMIT
Spring cover bushing	30.40 mm (1.197 in)

Replace the spring cover if the inner diameter of bushing is out of specification.

Drive Pulley Assembly

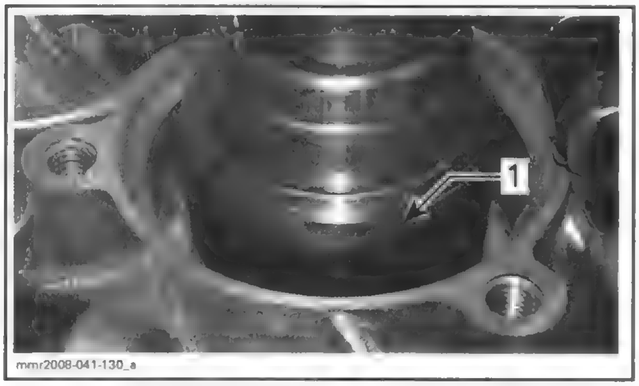
Sliding Sheave Bushing Installation

To install a **NEW** bushing, secure the spring compressor (P/N 529 036 012) in a vice and mount the sliding sheave.

Apply Loctite 680 (P/N 293 800 114) on the outside of bushing face.

Insert the bushing from inner side of sliding sheave.

Mount the sliding sheave bushing remover/ installer (P/N 529 035 931) with side marked "IN" to press in a new bushing.

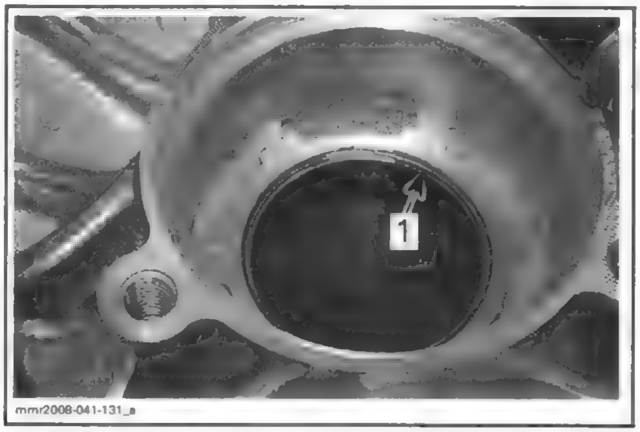


1. Mark "OUT" toward outside

NOTE: Make sure that the bushing is well seated on the sliding sheave.

1. Bushing

Install the circlip.



1. Circlip

CAUTION: Make sure that the circlip is properly position in its groove.

Ring Gear

Clean ring gear and the inner threads of fixed sheave.

Install **NEW** ring gear screws and torque them in accordance with the following chart.

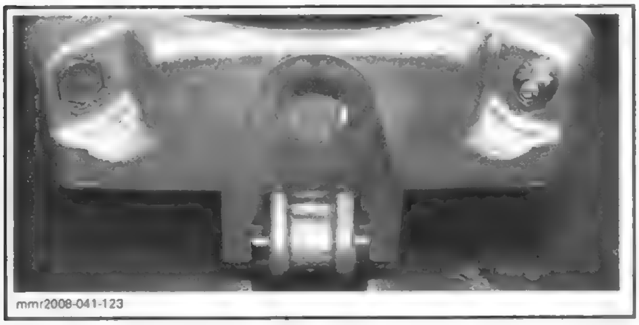
RING GEAR SCREW TORQUE	
500SS 600 HO SDI	27 N•m (20 lbf•ft)
800R	52 N•m (38 lbf•ft)

Sliding Sheave, Slider Shoes and Governor Cup

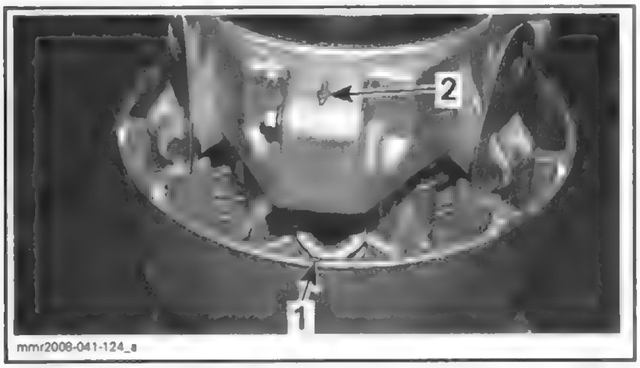
Install an O-ring on each slider shoes.

Insert slider shoes into governor cup so that groove in each slider shoe is vertical to properly slide in guides.

Install a slider shoe fork (P/N 529 005 500) into slider shoe grooves to maintain them for governor cup installation. Proceed on 3 set of slider shoes.



Make sure to align governor cup arrow with sliding sheave mark.



1. *Sliding sheave mark*
2. *Governor cup arrow*

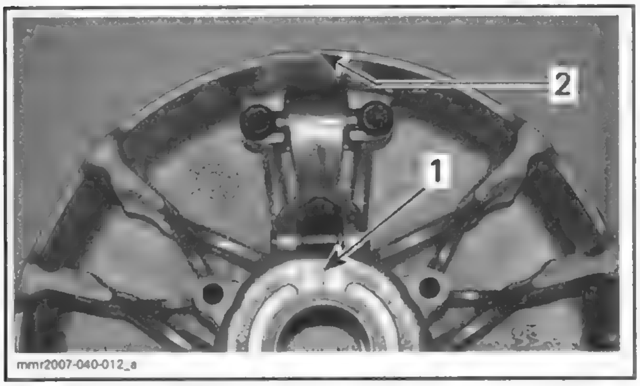
Carefully slide governor cup into sliding sheave.

Remove forks and push governor cup.

Spring Cover

To install spring cover, use spring compressor (P/N 529 036 012).

Align spring cover arrow with sliding sheave mark.

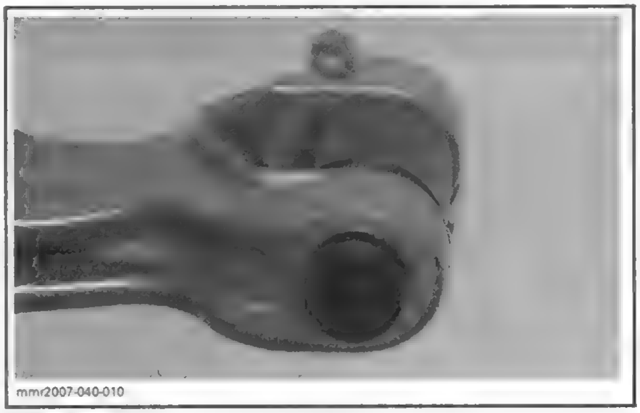


TYPICAL
1. *Spring cover arrow*
2. *Sliding sheave mark*

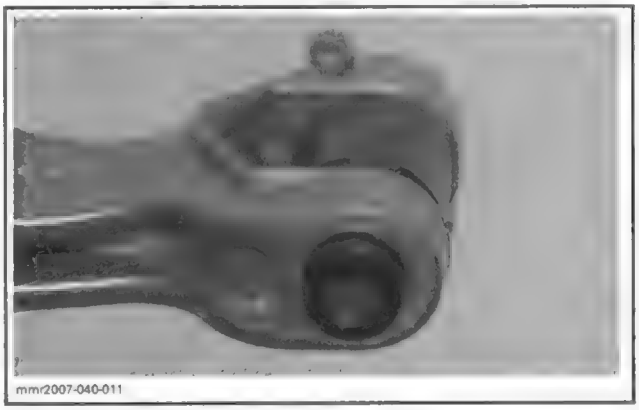
Tighten screws to 25 N•m (18 lbf•ft).

Lever, Roller and Pin

Always use the same type of pin as originally installed when servicing. Refer to *TECHNICAL SPECIFICATIONS*.



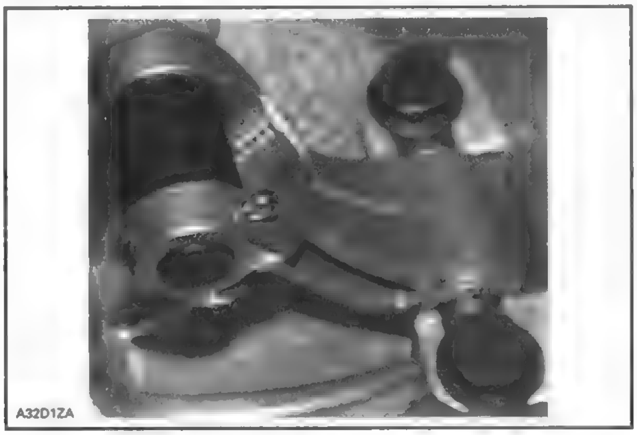
SOLID PIN



HOLLOW PIN

NOTE: Different types have different weights for calibration purpose. Refer to *HIGH ALTITUDE BULLETIN*.

While installing lever make sure that the curved sides of the levers are outwards as shown.

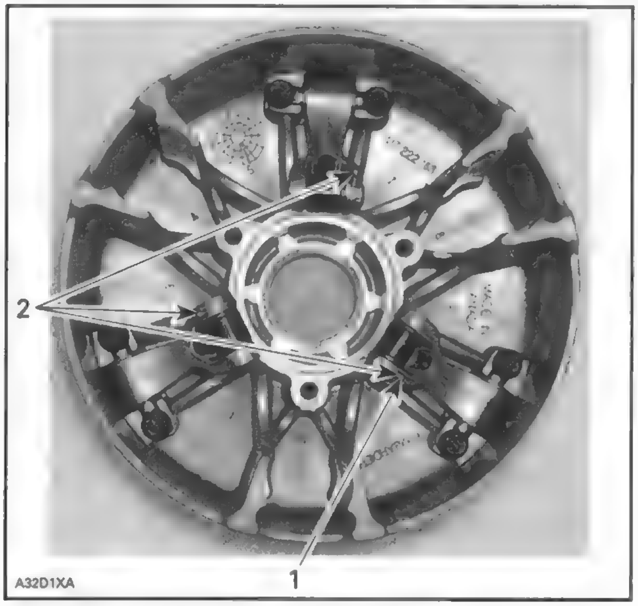


Always install lever assemblies so cotter pin heads are oriented on top when lever is set at the bottom of sliding sheave.

Bend cotter pin ends to sit perfectly against lever.

⚠ WARNING

Whenever replacing centrifugal levers, always replace all 3 at the same time. Otherwise, drive pulley unbalance will occur because of levers difference.



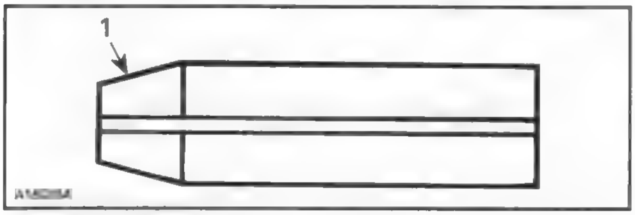
1. *Cotter pin head on top*
2. *All on the same side*

Torque lever screws to 10 N•m (89 lbf•**in**).

CAUTION: Levers and rollers must move easily after installation.

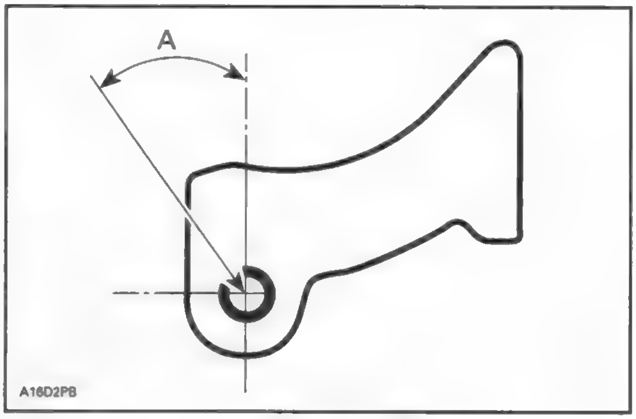
Ramp

Insert dowel tube from chamfered side.



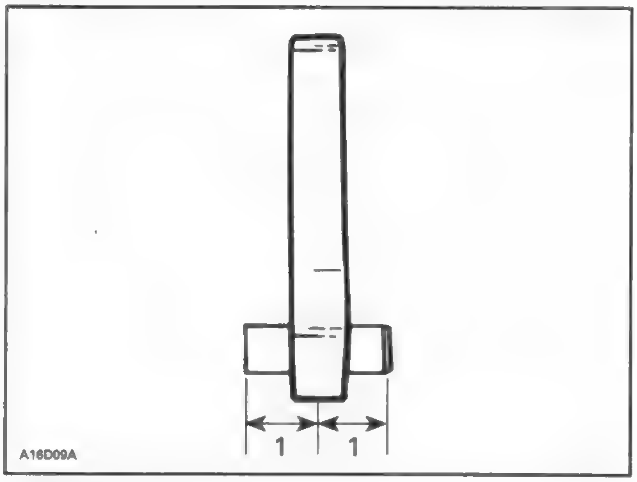
1. *Chamfered side*

Position dowel tube split at the angle "A".



MODEL	ANGLE "A"
All	45 ± 3°

Make sure ramp is centered on dowel tube.

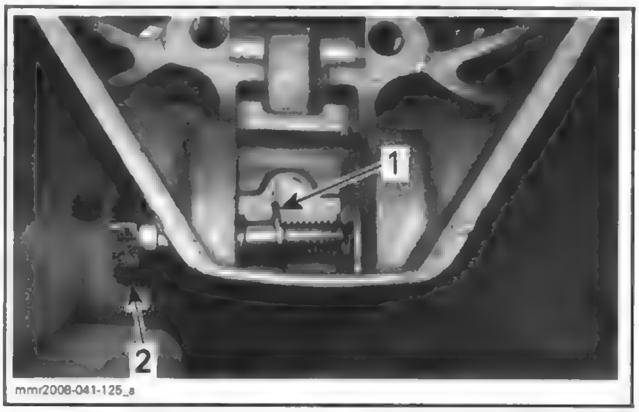


1. *Equal distance*

Torque ramp screws to 10 N•m (89 lbf•**in**).

Calibration Screw

When installing calibration screw, make sure to install washer as shown.



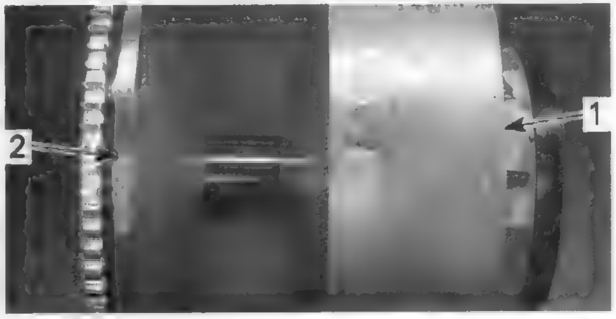
1. *Washer*
2. *Calibration screw*

NOTE: Refer to *DRIVE PULLEY ADJUSTMENT*, further in this section, to install the calibration screws in original setting.

Torque locking nut to 10 N•m (89 lbf•**in**).

Sliding Sheave and Fixed Sheave

To assemble the sliding sheave on the fixed sheave, align sliding sheave mark with the dot at the back of fixed sheave.



1. *Sliding sheave mark*
2. *Fixed sheave dot*

NOTE: On **500SS** and **600 HO SDI** models, push sliding sheave until governor cup splines are engaged on fixed sheave splines.

Drive Pulley Installation

Clean mounting surfaces as described in *DRIVE PULLEY CLEANING* above.

CAUTION: Do not apply antiseize or any lubricant on crankshaft and drive pulley tapers.

Install drive pulley on crankshaft extension.

Install a **NEW** conical spring washer with its concave side towards drive pulley then install drive pulley bolt.

CAUTION: Always use BRP genuine parts for conical spring washer and bolt.

Use the drive pulley holder (P/N 529 035 674) to retain drive pulley. See removal procedure.

Torque drive pulley bolt.

DRIVE PULLEY FIRST TORQUE	
500SS 600 HO SDI	90 N•m (66 lbf•ft)
800R	120 N•m (89 lbf•ft)

Before starting engine, perform drive pulley adjustment, see further in this section.

Install drive belt and guard.

Raise the rear of the vehicle and support it with a mechanical stand.

⚠ WARNING

Ensure that the track is free of particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure nobody is standing near the vehicle.

Accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake, repeat 5 times.

Re-torque drive pulley bolt.

DRIVE PULLEY FINAL TORQUE	
500SS 600 HO SDI	95 N•m (70 lbf•ft)
800R	120 N•m (89 lbf•ft)

⚠ WARNING

After 10 hours of operation the transmission system of the vehicle must be inspected to ensure drive pulley bolt is properly torqued.

Drive Pulley Adjustment

The drive pulley is factory calibrated to transmit maximum engine power at a predefined RPM. Factors such as ambient temperature, altitude or surface condition may vary this critical engine RPM thus affecting snowmobile efficiency.

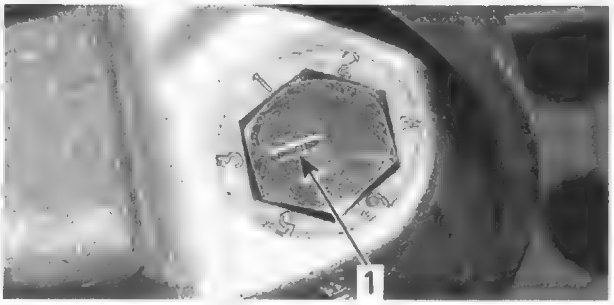
This adjustable drive pulley allows setting maximum engine RPM in the vehicle to maintain maximum power. Refer to *ENGINE MANAGEMENT SYSTEM* for engine RPM adjustment.

Calibration screws should be adjusted so that actual maximum engine RPM in vehicle matches the maximum horsepower RPM given in *TECHNICAL SPECIFICATIONS*.

NOTE: The adjustment has an effect on high RPM only.

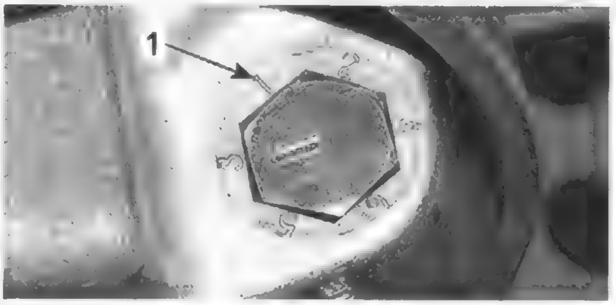
To adjust, modify ramp end position by turning calibration screws.

Calibration screw has a notch on top of its head.



1. Notch

Governor cup has 6 positions numbered 1 to 6.



1. Position 1

See the following table for original setting.

CALIBRATION SCREW			
ENGINE	MODEL		POSITION
500SS	GSX	Sport	2
	MX Z	Trail and TNT	2
600 HO SDI	GSX	Limited and Limited Touring	3
	MX Z	Renegade, Renegade X and X	3
800R	GSX	Limited	3
	MX Z	Adrenaline, Renegade, Renegade X and X	3
	SUMMIT	X 154" (EUR)	3
		All other models	1

Each number modifies maximum engine RPM by about 200 RPM.

Lower numbers decrease engine RPM in steps of 200 RPM and higher numbers increase it in steps of 200 RPM.

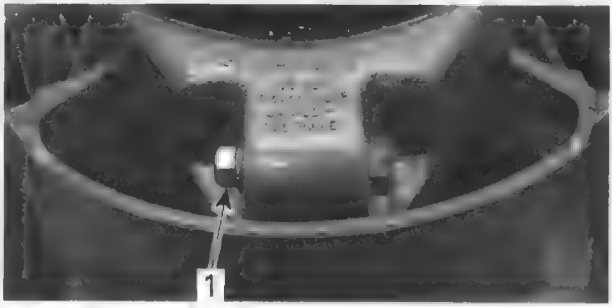
Example:

Calibration screw is set at position 3 and is changed to position 5. So maximum engine RPM is increased by about 400 RPM.

To Adjust:

Just loosen locking nut enough to pull calibration screw **partially** out. Do not completely remove the locking nut.

CAUTION: Do not completely remove calibration screw otherwise its inside washer will fall off.



1. Loosen just enough to permit rotating of calibration screw

Adjust to desired position.

CAUTION: Always adjust all 3 calibration screws and make sure they are all set at the same number.

Torque locking nuts to 10 N•m (89 lbf•**in**).

DRIVEN PULLEY AND COUNTERSHAFT

SERVICE TOOLS

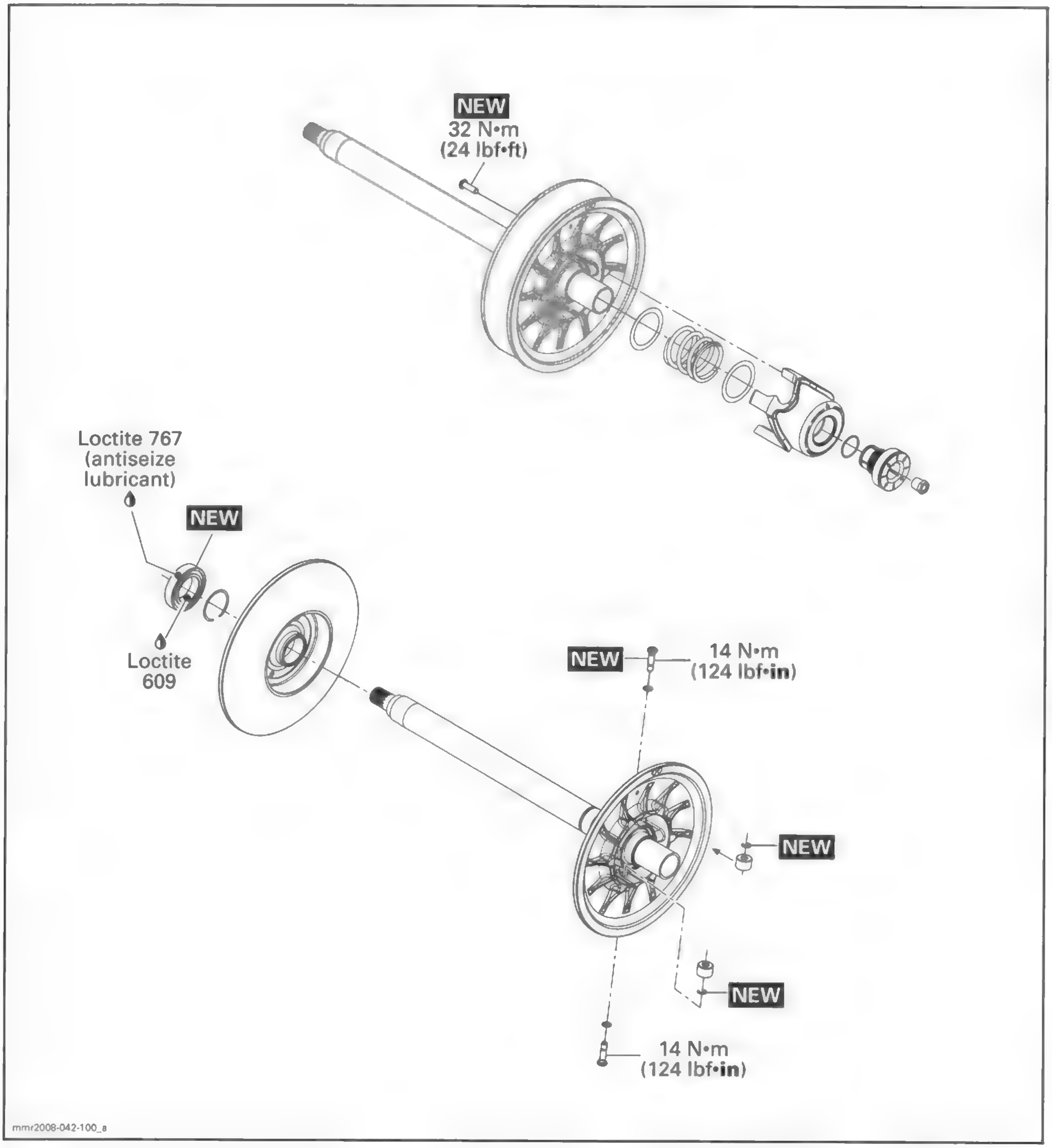
Description	Part Number	Page
driven spring compressor	529 036 064	380
countershaft bearing remover	529 036 065	384
countershaft bearing installer	529 036 066	385
countershaft support	529 036 067	384
upper gear retaining tool	529 036 110	379

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
rotor clip applicator	A-150	383

SERVICE PRODUCTS

Description	Part Number	Page
Loctite 767 (antiseize lubricant)	293 800 070	384
Loctite 609	413 703 100	385
pulley flange cleaner	413 711 809	382, 384


NEW
32 N•m
(24 lbf•ft)
Loctite 767
(antiseize
lubricant)
NEW
Loctite
609
NEW
14 N•m
(124 lbf•in)
NEW
NEW
14 N•m
(124 lbf•in)
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GENERAL

During assembly/installation, use the torque values and the service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pins, etc.) must be replaced with new ones.

⚠ WARNING

Never start engine when the pulley guard is removed.

PROCEDURES

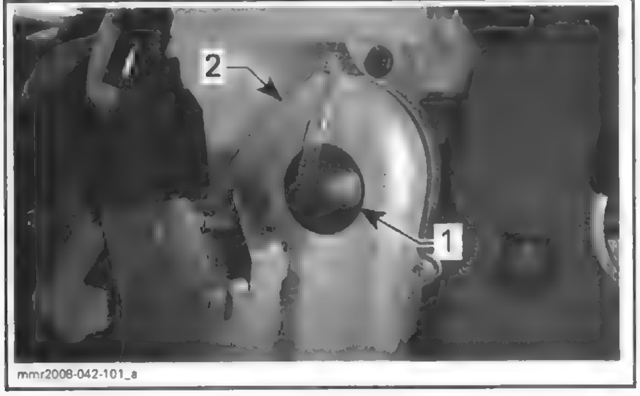
DRIVEN PULLEY

Driven Pulley Removal

Open left side panel.

Remove the muffler. Refer to *EXHAUST SYSTEM* section.

Remove the filling plug.



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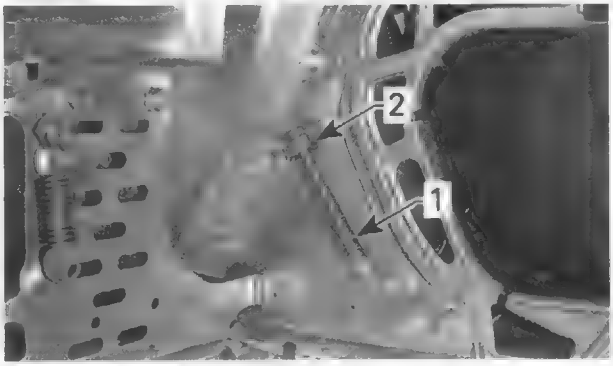
1. *Filling plug*
2. *Chaincase cover*

Release drive chain tension by unscrewing tensioner adjustment screw.



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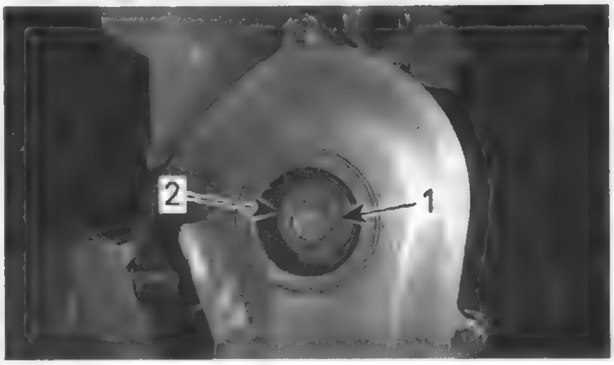
1. *Tensioner adjustment screw*
2. *Lock nut*

Remove the upper gear screw and the conical spring washer.



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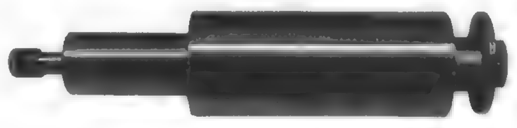
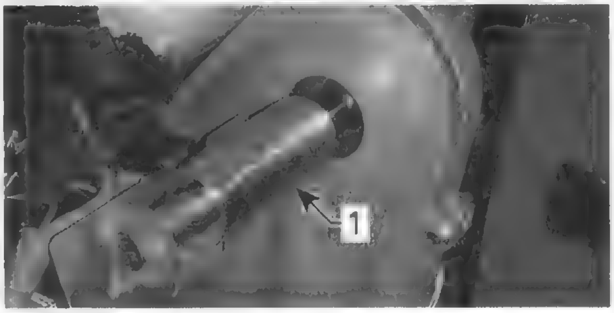
1. *Upper gear screw*
2. *Conical spring washer*

Install the upper gear retaining tool (P/N 529 036 110) on countershaft end.



529036110



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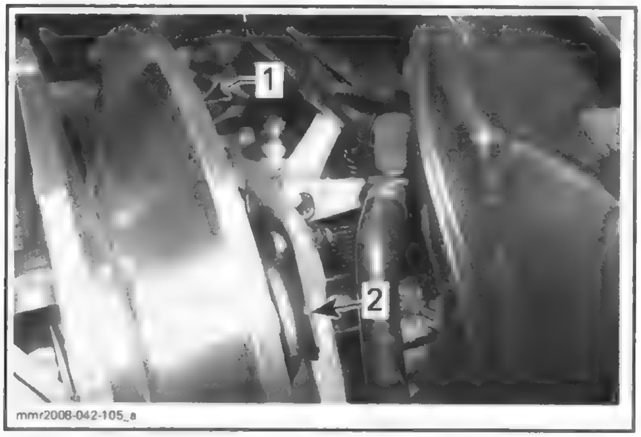
1. *Upper gear retaining tool*

Open right side panel.

Remove the drive belt. Refer to *DRIVE BELT* section.

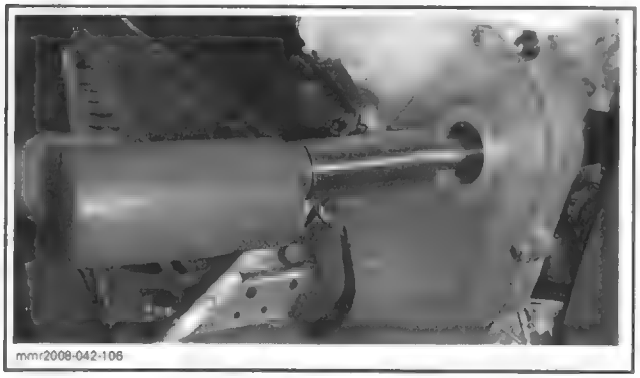
Behind driven pulley, remove screw securing the countershaft bearing flange.



1. Driven pulley
2. Countershaft bearing flange

Pull the driven pulley to disengage countershaft and upper gear.

NOTE: If necessary, tap the upper gear retaining tool with a plastic hammer.



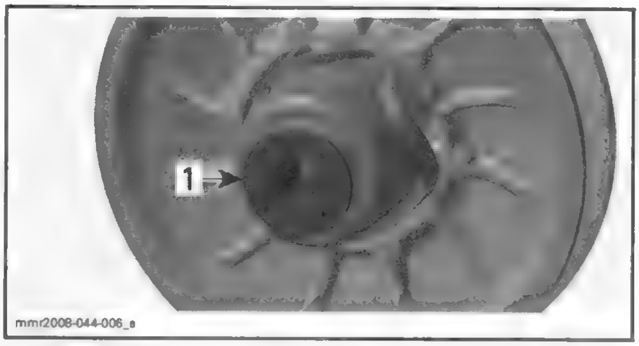
Unscrew countershaft from the upper gear retaining tool. Do not remove tool.

NOTE: While countershaft is removed from vehicle, the upper gear retaining tool keeps the drive chain and the upper gear in position inside chaincase.

Driven Pulley Disassembly

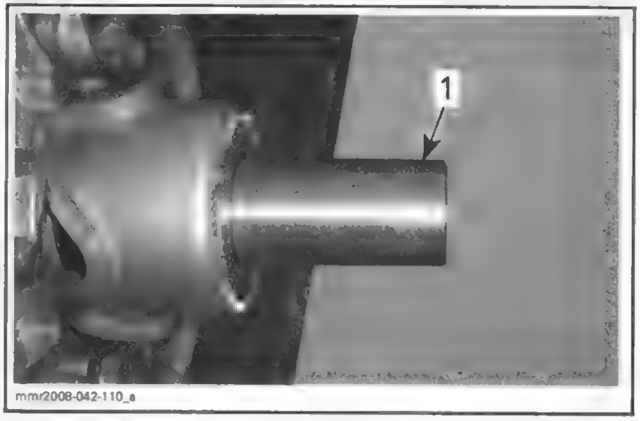
Cam and Spring

Unscrew and remove the adjustment ring.



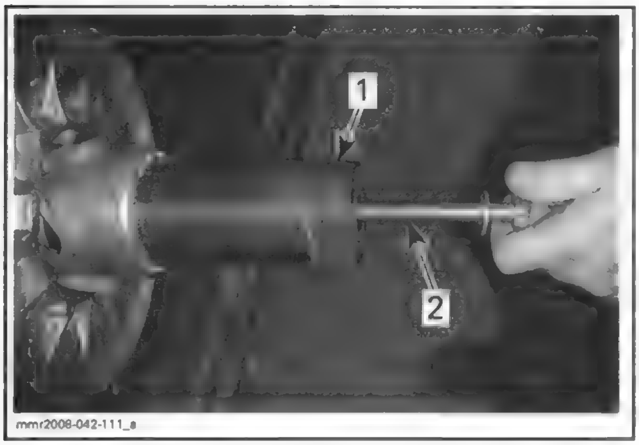
1. Adjusting ring

Install the threaded adapter of the driven spring compressor (P/N 529 036 064) at the end of driven pulley.



1. Threaded adapter

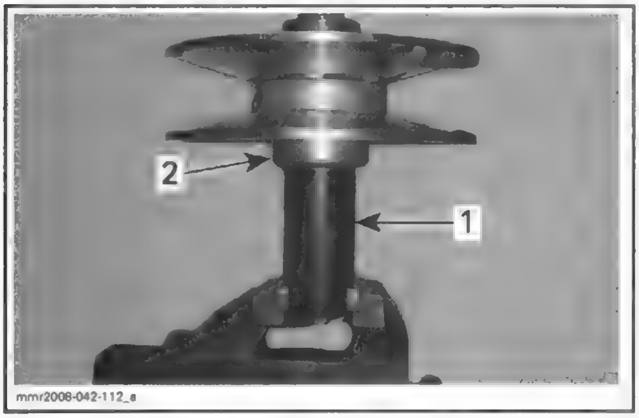
Install the external sleeve over the threaded adapter and secure sleeve with the driven spring compressor screw.



1. *External sleeve*
2. *Driven spring compressor screw*

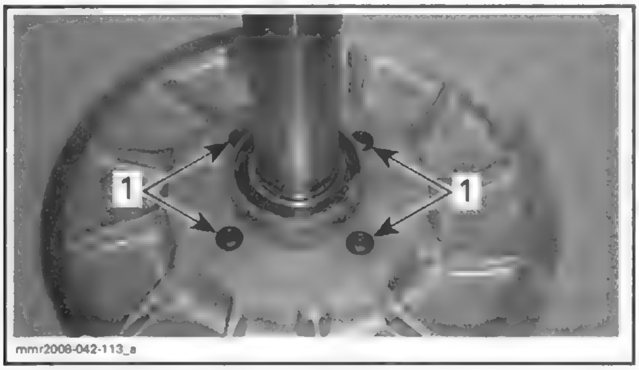
Tighten the driven spring compressor screw to compress the cam.

Install the driven spring compressor in a vice.



1. *Driven spring compressor*
2. *Driven pulley*

Using a heat gun, heat cam screws to break the thread locker.



1. *Heat cam screws*

Remove and discard cam screws.

Unscrew the driven spring compressor screw completely. Remove cam and spring.

Sliding Sheave

Remove the cam and spring.

Remove the *COUNTERSHAFT BEARING*, see procedure in this section.

Remove sliding sheave.

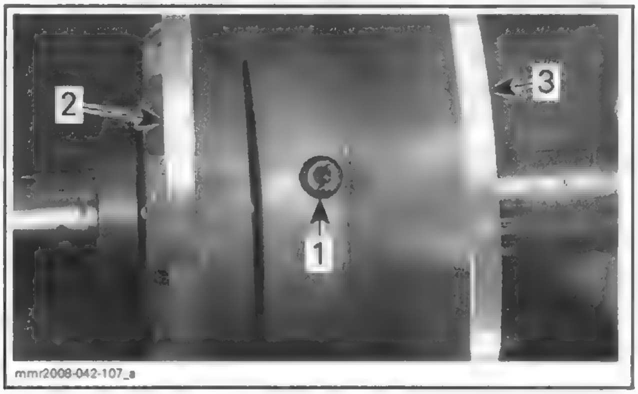
Fixed Sheave

The fixed sheave and countershaft are sold as an assembly. They are not available separately.

Driven Pulley Rollers

Move apart sliding and fixed sheaves.

Remove and **discard** pivot screws.



1. *Pivot screw*
2. *Sliding sheave*
3. *Fixed sheave*

Remove rollers.

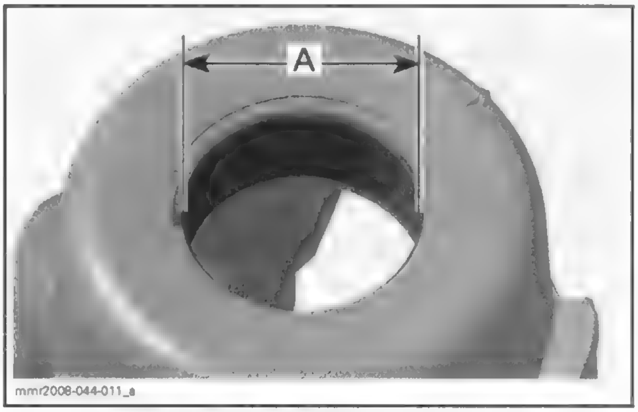
Discard E-clips.

Driven Pulley Inspection

Cam and Spring

Verify contact surfaces of cam for visible damages. Replace cam if necessary.

Using a dial bore gauge, measure the inner diameter of cam bushing. Measuring point must be at least 5 mm (1/4 in) from bushing edge.



A. *Inner diameter of cam bushing*

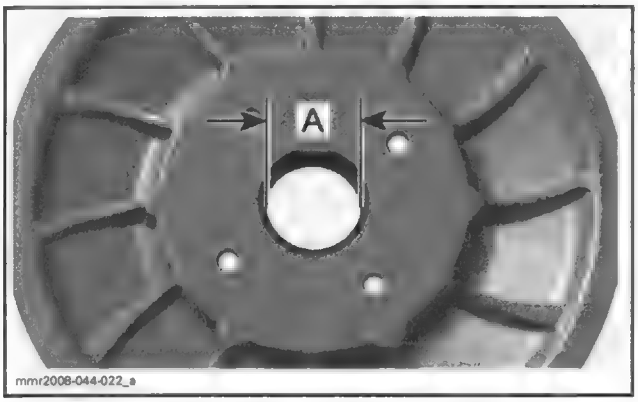
BUSHING	SERVICE LIMIT
Cam bushing	41.5 mm (1.634 in)

Replace the cam if the inner diameter of bushing is out of specification.

Sliding Sheave

Inspect pulley sheave for marks or scratches.

Using a dial bore gauge, measure the inner diameter of sliding sheave bushing. Measuring point must be at least 5 mm (1/4 in) from bushing edge.



A. *Inner diameter of sliding sheave bushing*

BUSHING	SERVICE LIMIT
Sliding sheave bushing	41.5 mm (1.634 in)

Replace the sliding sheave if the inner diameter of bushing is out of specification.

Fixed Sheave

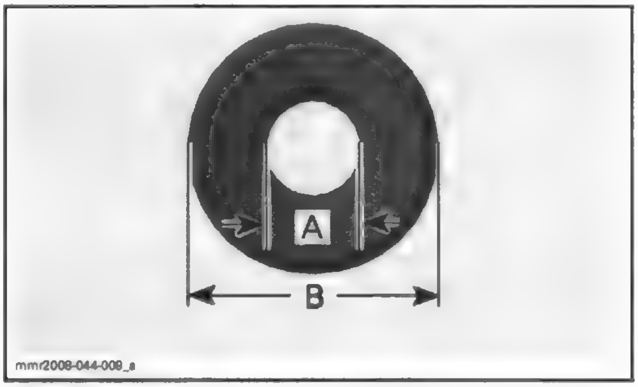
Replace fixed sheave and countershaft if one of the following problem is detected:

- Marks or scratches on pulley sheave
- Bent, twisted or otherwise damaged countershaft
- Defective splines and threads at the end of countershaft.

Driven Pulley Rollers

Check the rollers for flat spots, cracks or other visible damages. Replace if necessary.

Measure inner and outer diameter of rollers.



A. *Inner diameter*
B. *Outer diameter*

ROLLER DIAMETER	SERVICE LIMIT
Inner diameter	8.5 mm (.335 in)
Outer diameter	21.5 mm (.846 in)

Measure the roller thickness.

A
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A. *Thickness of roller*

ROLLER THICKNESS	
SERVICE LIMIT	14.75 mm (.581 in)

If a roller is out of specifications, replace both rollers at the same time.

Driven Pulley Cleaning

Use the pulley flange cleaner (P/N 413 711 809) and a clean rag to clean pulley sheaves.

Cam and Spring

During break-in period, teflon from bushing moves to cam or countershaft surface. A teflon over teflon running condition occurs, leading to low friction. So it is normal to see gray teflon deposit on cam or countershaft. Do not remove this deposit.

When a dust deposit has to be removed from the cam or the countershaft, use dry cloth to avoid removing transferred teflon.

Driven Pulley Assembly

Driven Pulley Rollers

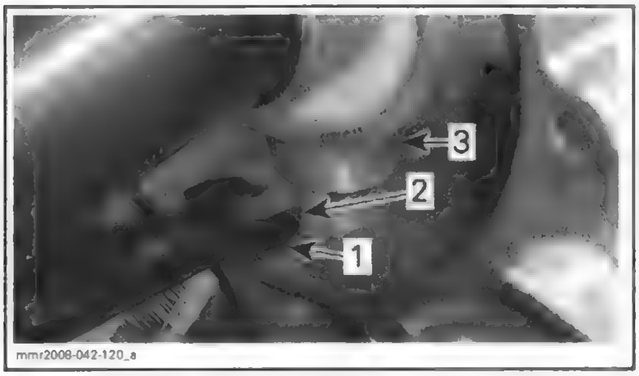
Using a screw tap, clean pivot screw threaded holes into fixed sheave.

Using **NEW** pivot screws, install rollers into fixed sheave.

CAUTION: Always use new pivot screws with pre-applied threadlocker.

Torque pivot screws to 14 N•m (124 lbf•**in**).

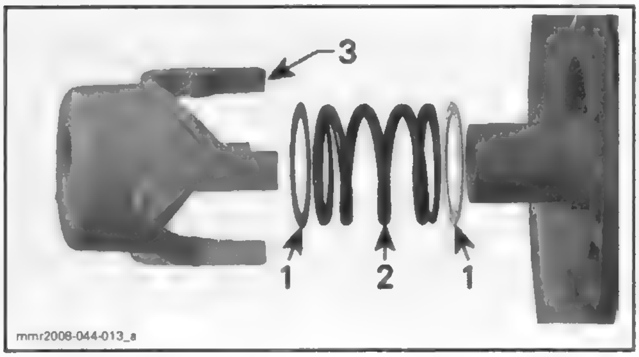
Using a rotor clip applicator (P/N A-150), install **NEW** E-clips to lock pivot screws.



1. *E-clip applicator*
2. *E-clip*
3. *Roller*

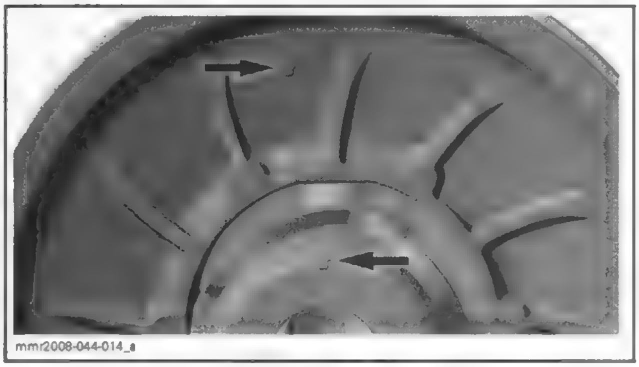
Cam and Spring

Install a spring stopper, the spring, the other spring stopper and the cam.



1. *Spring stopper*
2. *Spring*
3. *Cam*

Align the arrow on cam with the arrow on fixed sheave. At the end of cam installation, the arrow on the cam should be move clockwise (± 30°).



Install the driven spring compressor sleeve and tighten the driven spring compressor screw until cam is completely pressed against sliding sheave.

Behind sliding sheave, install 4 **NEW** cam screws.

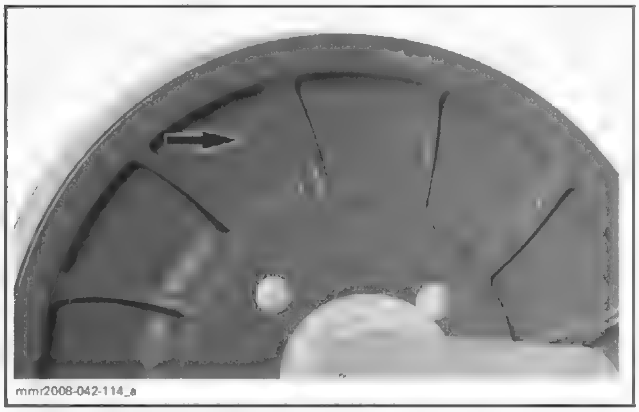
Torque cam screws to 32 N•m (24 lbf•ft).

Remove the driven spring compressor.

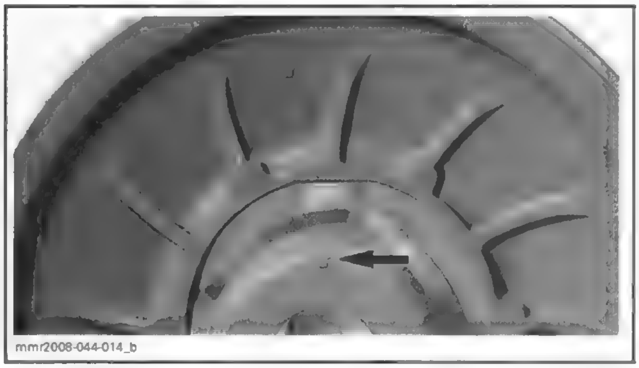
Sliding Sheave

The assembly of sliding sheave is the reverse of the disassembly. However, pay attention to the following.

When installing sliding sheave, make sure to align its arrow with the arrow on cam.



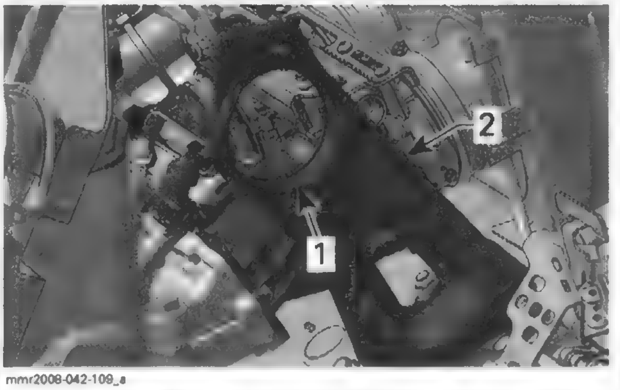
SLIDING SHEAVE ARROW



CAM ARROW

Driven Pulley Installation

Using sand paper (600-grit or 1000-grit) or steel wool, remove any rust on bearing shoulder of countershaft bearing support.



1. Bearing shoulder
2. Countershaft bearing support

Apply a thin layer of Loctite 767 (antiseize lubricant) (P/N 293 800 070) on bearing shoulder.

Insert countershaft through countershaft bearing support.

Fasten the end of countershaft to upper gear retaining tool.

Align countershaft splines with upper gear splines.

Using the upper gear retaining tool as a puller, install countershaft into upper gear. Ensure countershaft bearing is installed properly into countershaft bearing support.

Remove the upper gear retaining tool.

Install the upper gear screw and the conical spring washer.

NOTE: The conical spring washer must be installed with its concave side towards upper gear.

Tighten upper gear screw to 48 N•m (38 lbf•ft).

Install filling plug.

On LH side, install the bearing flange.

Tighten nut to 15 N•m (133 lbf•**in**).

Install all other removed parts.

COUNTERSHAFT

The countershaft and the fixed sheave are sold as an assembly. They are not available separately.

Countershaft Removal and Installation

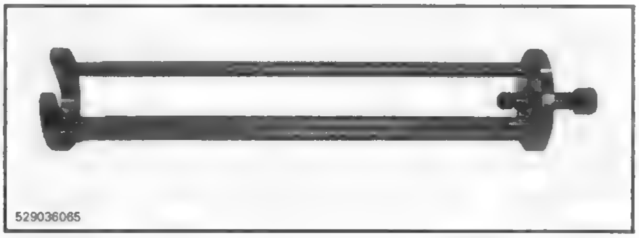
Refer to *DRIVEN PULLEY* for the procedures.

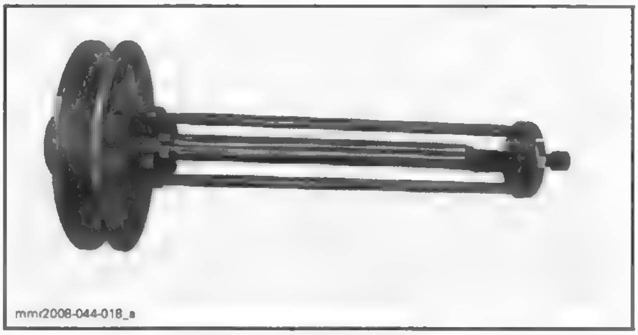
COUNTERSHAFT BEARING

Countershaft Bearing Removal

Remove *DRIVEN PULLEY*, see procedure in this section.

Install the countershaft bearing remover (P/N 529 036 065) on countershaft.



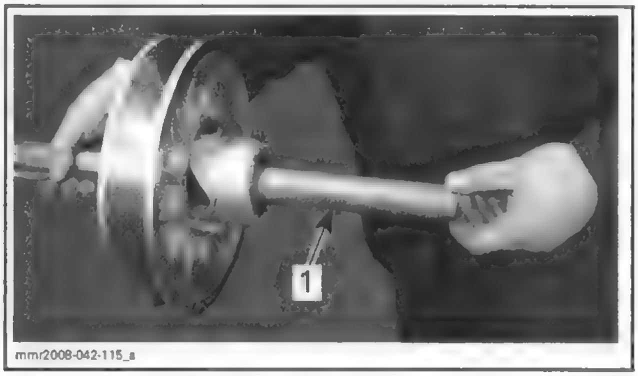


Tighten the screw at the end of tool to extract the bearing. Discard the bearing.

Countershaft Bearing Installation

Remove the adjustment ring on cam.

Insert the countershaft support (P/N 529 036 067) into countershaft.



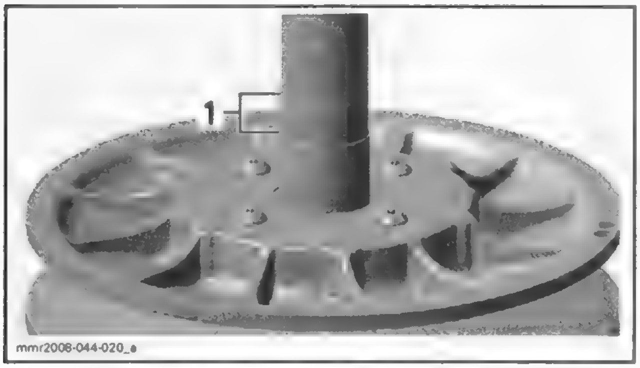
1. Countershaft support

CAUTION: The countershaft support is mandatory to avoid damaging the countershaft threaded end and the cam during bearing installation.

Using pulley flange cleaner (P/N 413 711 809), clean residues on countershaft bearing surface.

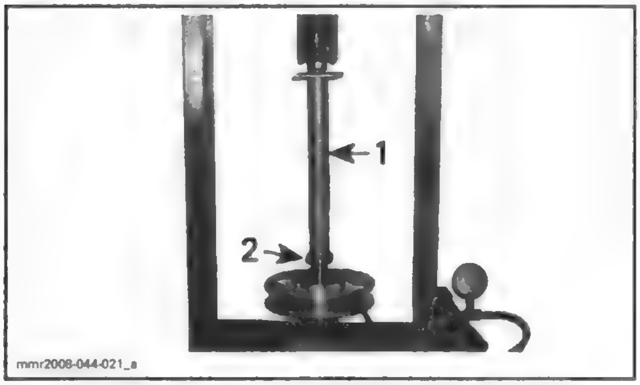
Check countershaft bearing surface for wear.

Apply Loctite 609 (P/N 413 703 100) on countershaft bearing surface.



1. Apply Loctite 609 in this region

Using a press and the countershaft bearing installer (P/N 529 036 066), install the NEW bearing on countershaft.



1. Countershaft bearing installer
2. NEW bearing

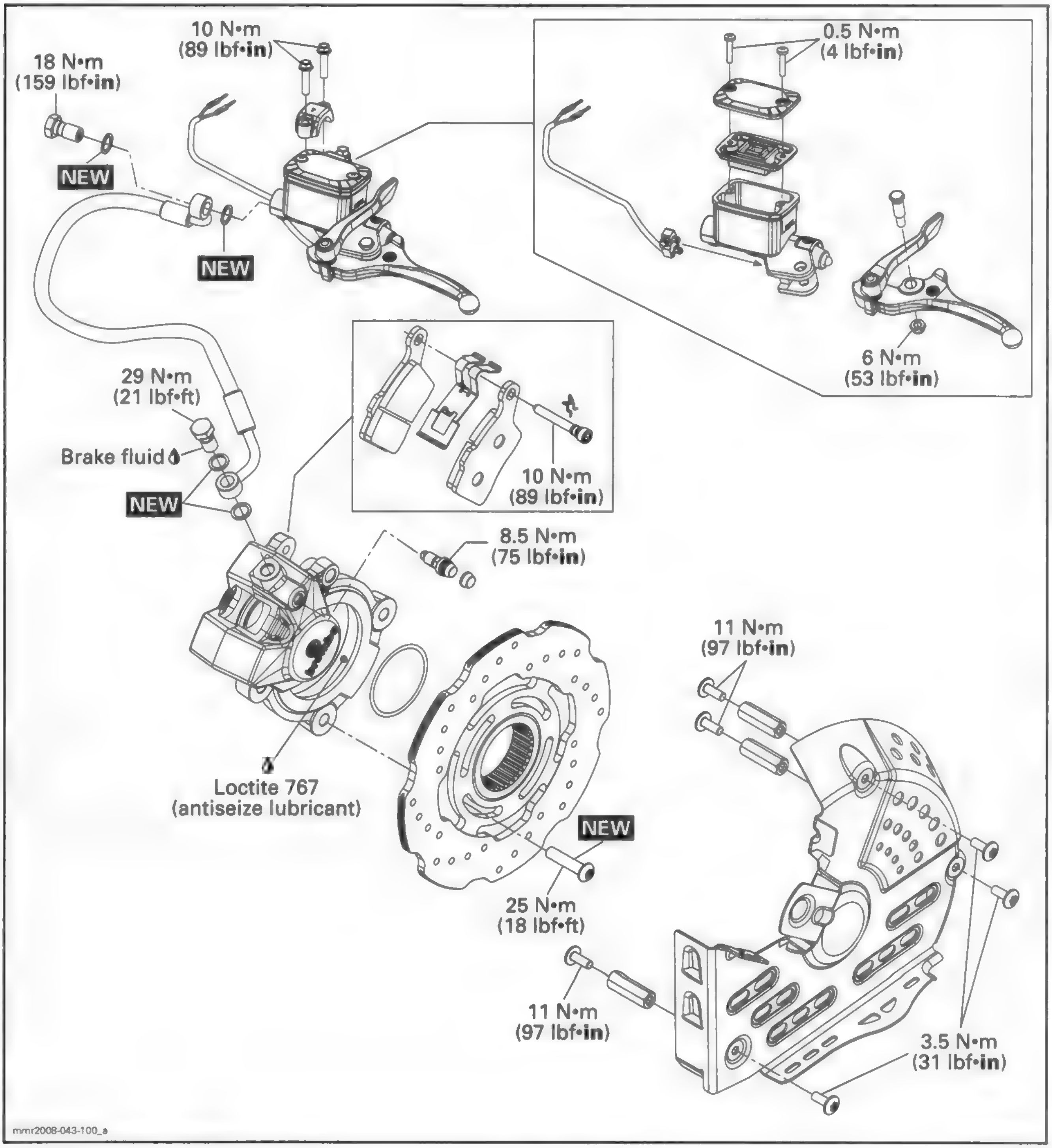
CAUTION: Use a press only, never tap on countershaft bearing installer with an hammer to avoid damaging bearing and countershaft.

Clean the surplus of Loctite with a rag to avoid having Loctite on sliding sheave bushing.

BRAKE

SERVICE PRODUCTS

Description	Part Number	Page
DOT 4 brake fluid GTLMA	293 600 062	388
Loctite 767 (antiseize lubricant)	293 800 070	391


10 N•m
(89 lbf•in)
18 N•m
(159 lbf•in)
0.5 N•m
(4 lbf•in)
NEW
NEW
6 N•m
(53 lbf•in)
29 N•m
(21 lbf•ft)
Brake fluid
NEW
10 N•m
(89 lbf•in)
8.5 N•m
(75 lbf•in)
11 N•m
(97 lbf•in)
Loctite 767
(antiseize lubricant)
NEW
25 N•m
(18 lbf•ft)
11 N•m
(97 lbf•in)
3.5 N•m
(31 lbf•in)
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GENERAL

During assembly/installation, use torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pins, etc.) must be replaced with new ones.

⚠ WARNING

A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean contaminated disc with a high quality brake degreasing agent.

CAUTION: Avoid spilling brake fluid on plastic, rubber or painted parts. Protect these parts with a rag when servicing brake system.

CAUTION: To avoid serious damage to the brake system, use only DOT 4 brake fluid from a sealed container. Do not use brake fluid taken from old or already opened containers, nor mix different fluids for topping off.

CAUTION: Sealing washers must be discarded and replaced with NEW ones every time a Banjo fitting is unscrewed.

PROCEDURES

BRAKE FLUID

The brake fluid must be changed in accordance with the maintenance chart.

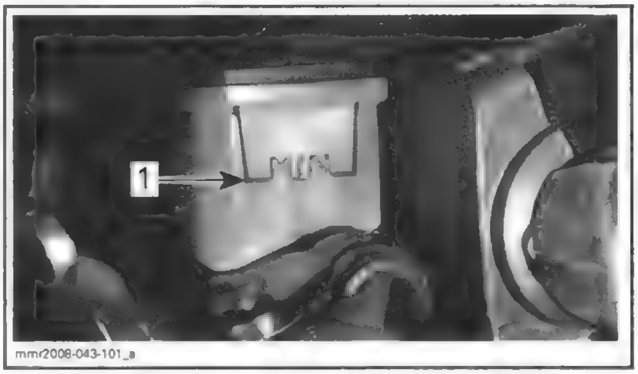
Recommended Brake Fluid

Always use brake fluid meeting the specification DOT 4 such as DOT 4 brake fluid GTLMA (P/N 293 600 062) sold by BRP.

Brake Fluid Level

With the vehicle on a level surface, position steering in straight-ahead position to ensure reservoir is level.

Brake fluid must always be above the MIN line when brake lever is squeezed.

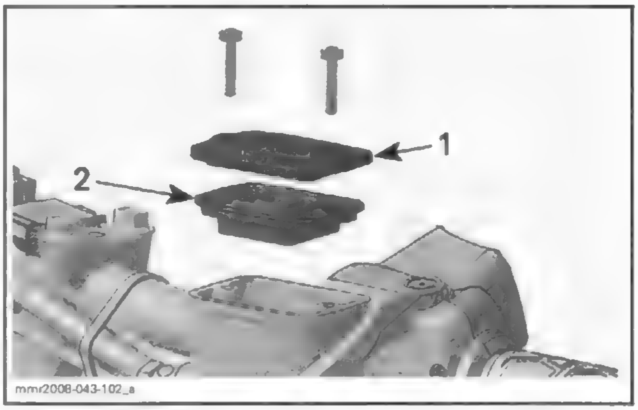


1. *MINIMUM line*

Brake Fluid Replacement

Draining

Remove reservoir cover with its diaphragm.

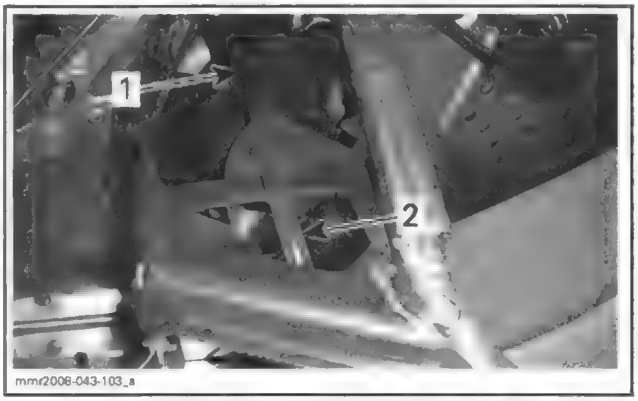


1. *Reservoir cover*
2. *Diaphragm*

Connect a clear hose to caliper bleeder.

Place the other end of hose in a container.

Loosen bleeder and pump brake lever until no more fluid flows out of bleeder.

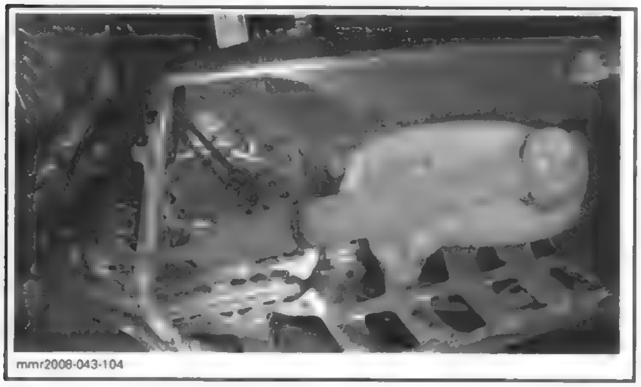


1. *Bleeder*
2. *Clear hose to catch used brake fluid*

Filling and Bleeding

To fill brake circuit when it is empty do the following:

- Ensure reservoir cover is removed.
- Using a big syringe, push brake fluid slowly into the caliper.



- Continue to push brake fluid until reservoir is half full.
- Close bleeder.
- Add brake fluid into reservoir.
- Squeeze brake lever. It should be firm.

If so, tighten bleeder to 8.5 N•m (75 lbf•**in**) and install cover on reservoir.

If not, bleed brake circuit as per the following procedure:

- Install a clear hose on bleeder.
- Pump up circuit pressure with brake lever until lever resistance is felt.
- Squeeze brake lever and open bleeder. When lever touches the handlebar, do not release lever and close bleeder.
- Release brake lever slowly.
- Repeat the procedure until no more air bubbles appear in hose and lever is firm.

NOTE: Check fluid level often to prevent air from being pumped into the circuit.

If the lever is still spongy, push back brake pads and squeeze brake lever before repeating the procedure.

- Repeat until brake lever is firm.
- Tighten bleeder to 8.5 N•m (75 lbf•**in**).
- Install diaphragm and cover on reservoir.

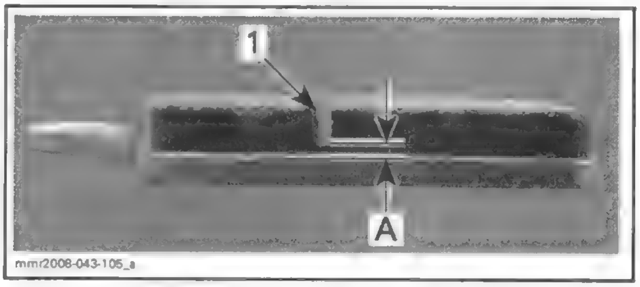
BRAKE PADS

Brake Pads Inspection

Measure brake pad lining thickness.

SERVICE LIMIT	
Brake pad thickness	1 mm (.04 in)

CAUTION: Brake pads must always be replaced in pairs.

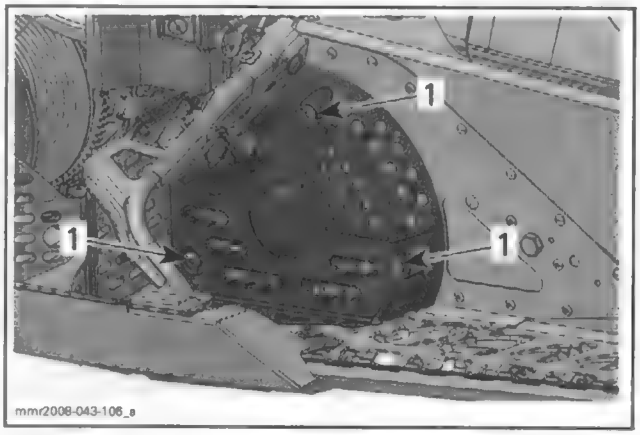


1. Groove on pad lining
A. Brake pad minimum thickness 1 mm (1/32 in)

Inspect brake disc at the same time.

Brake Pads Replacement

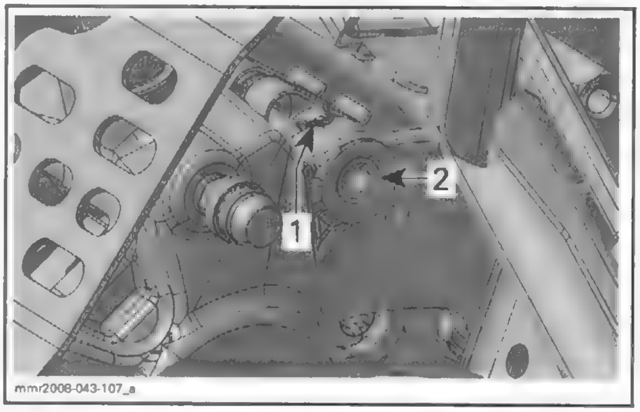
Remove the disc brake protective cover.



1. Screws

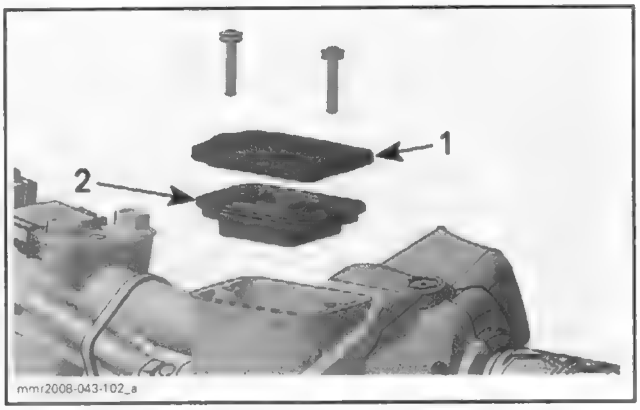
Remove the clip securing pad pin.

Unscrew and remove the pad pin.



1. Clip
2. Brake pad pin

Remove reservoir cover with its diaphragm.

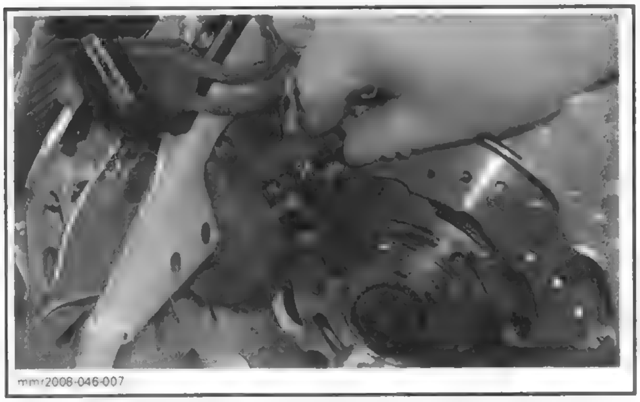


1. *Reservoir cover*
2. *Diaphragm*

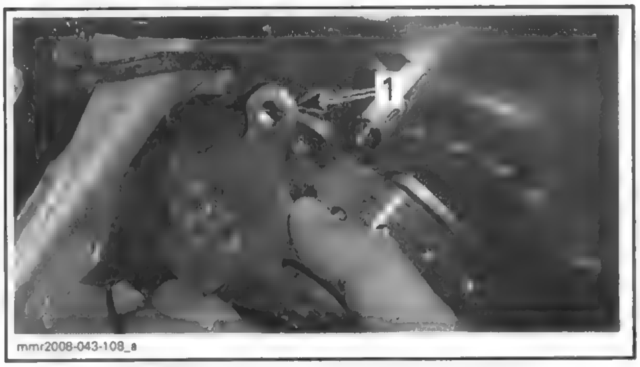
Using a flat screwdriver, depress pistons into their bores.

CAUTION: Pay attention to avoid scratching brake disc.

Remove brake pads.



Install **NEW** brake pads with tabs upward.



1. *Brake pad tab*

Install brake pad pin.

Tighten pin to 10 N•m (89 lbf•**in**).

Install clip on brake pad pin. If the clip seems loose, replace it with a new one.

Install the reservoir cover.

Depress brake lever to seat brake pads against disc brake.

Install the disc brake protective cover.

Ride the vehicle a few minutes to make sure the repair is successful.

CALIPER

Caliper Removal

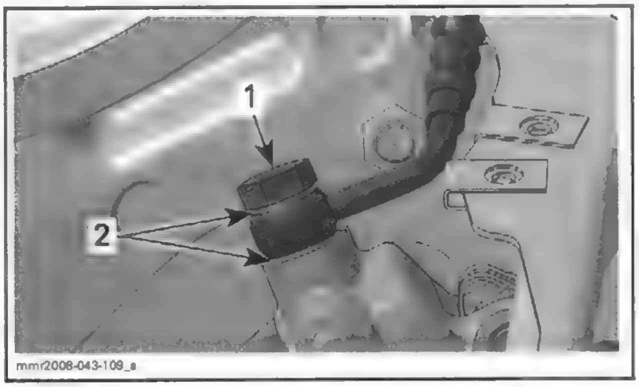
Open RH side panel.

Remove drive belt guard support. Refer to *DRIVE BELT* section.

NOTE: If the caliper is not replaced, omit the next steps concerning the brake system draining and brake hose removal.

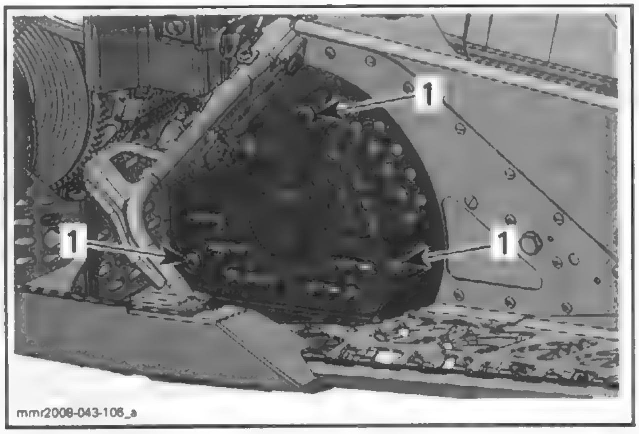
Drain the brake system, refer to *BRAKE FLUID REPLACEMENT* in this section.

Remove the Banjo fitting and discard the sealing washers.



1. *Banjo fitting*
2. *Sealing washers*

Remove the brake disc protective cover.

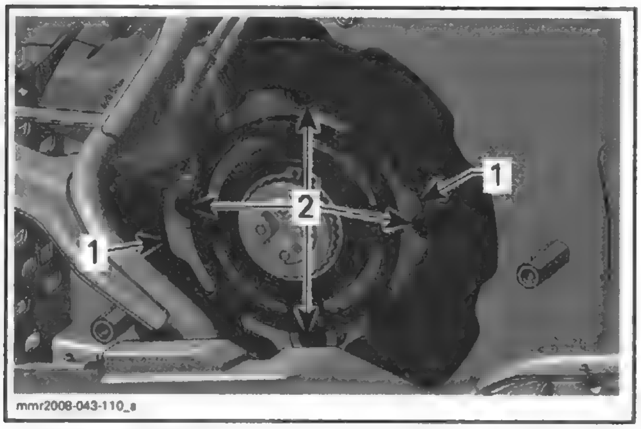


1. *Screws*

Lift the rear of vehicle and release track tension completely.

Turn driven pulley to align brake disc slots with caliper bracket screws.

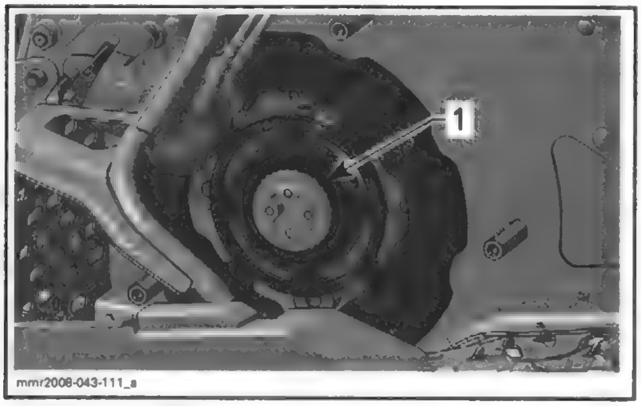
Remove caliper screws (4) behind disc brake.



1. *Brake disc slots*
2. *Caliper screws behind disc brake*

Remove *BRAKE PADS*, see procedure in this section.

Remove the circlip securing disc brake to drive shaft.



1. *Brake disc circlip*

Pull brake disc and caliper.

When brake disc is out of splines, remove it.

Remove caliper.

CAUTION: Do not let caliper hangs by the hose and do not stretch or twist the hose.

Caliper Inspection

Check pistons for:

- Rust
- Scratches
- Leaks.

Check caliper bracket for:

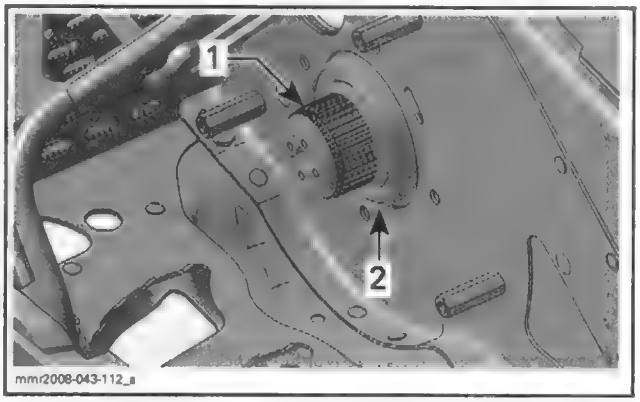
- Cracks
- Rust on bearing shoulder (clean with a steel wood).

Replace caliper if required.

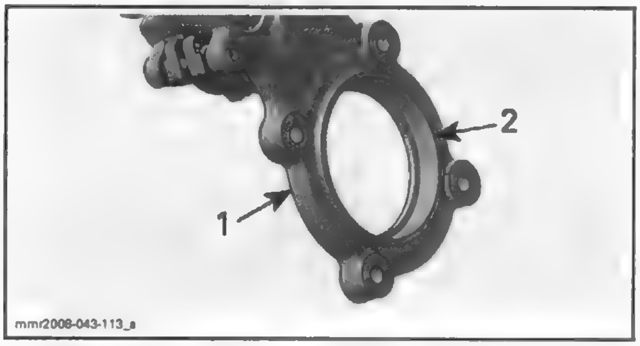
Caliper Installation

Using a small piece of wood, push both pistons into their bores.

Apply Loctite 767 (antiseize lubricant) (P/N 293 800 070) on drive shaft splines and on caliper bracket bearing shoulder.

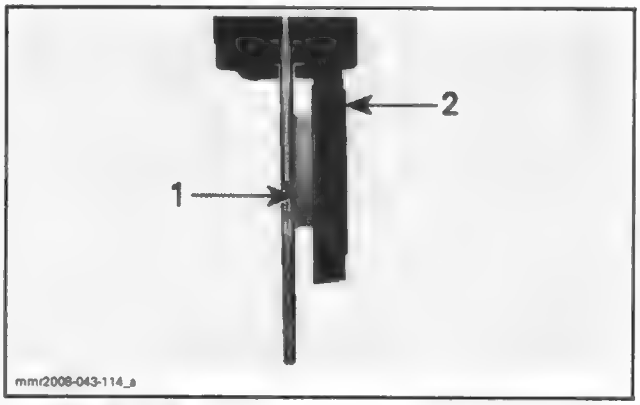


1. *Drive shaft splines*
2. *Drive shaft bearing*



1. *Caliper bracket*
2. *Bearing shoulder*

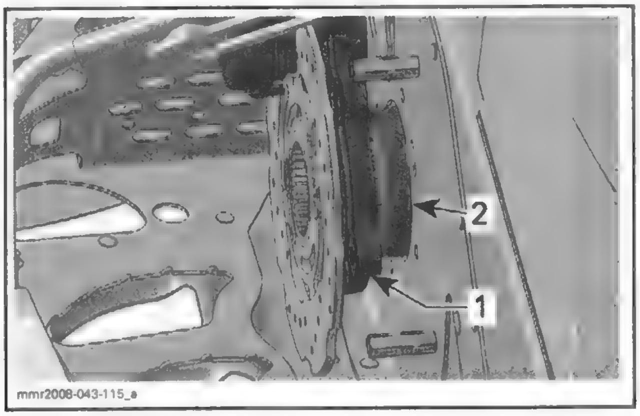
Insert brake disc into caliper. The brake disc collar must pointed toward the frame.



1. *Brake disc collar*
2. *Caliper bracket*

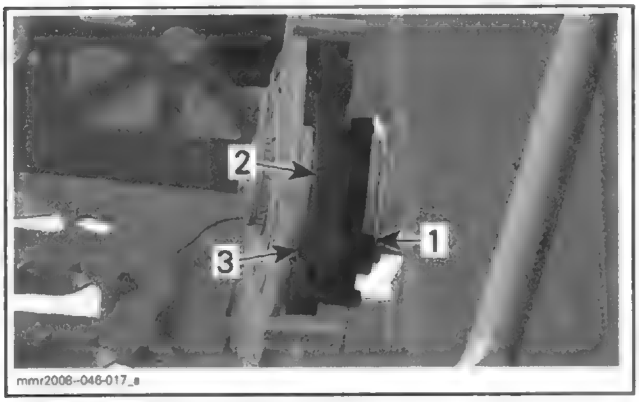
Align brake disc splines with drive shaft splines and push the disc on the shaft.

Push the caliper bracket over drive shaft bearing.



1. *Caliper bracket*
2. *Drive shaft bearing*

Align caliper bracket holes with bearing flange holes and install caliper screws.



1. *Bearing flange (inside frame)*
2. *Caliper bracket*
3. *Caliper screws*

HAND TORQUE each caliper bracket screws in a criss-cross sequence until bracket is correctly positioned against frame.

CAUTION: Never use an air tool to tighten caliper screws. The caliper bracket could cracked.

Torque screws to 25 N•m (18 lbf•ft).

Install the brake disc circlip.

Apply brake fluid on Banjo fitting threads.

Install the Banjo fitting with two **NEW** sealing washers.

Torque Banjo fitting to 29 N•m (21 lbf•ft).

Fill and bleed the brake system. Refer to *BRAKE FLUID REPLACEMENT* in this section.

BRAKE DISC

Brake Disc Inspection

Prior Brake Disc Removal

Remove the disc brake protective cover.

Check for scoring, cracking or bending, replace as required.

Measure brake disc thickness. If the brake disc is out of specification, replace it with a new one.

CAUTION: Brake disc should never be machined.

BRAKE DISC THICKNESS	
Minimum thickness	4.5 mm (.177 in)

After Brake Disc Removal

Check brake disc splines and drive shaft splines for wear or other damages. Replace defective parts.

Brake Disc Removal and Installation

Use the same procedure as for the caliper.

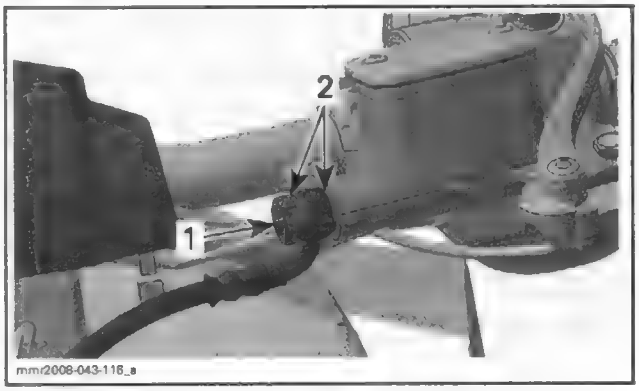
MASTER CYLINDER

Master Cylinder Removal

NOTE: If the master cylinder is not replaced, omit the next steps concerning the brake system draining and brake hose removal.

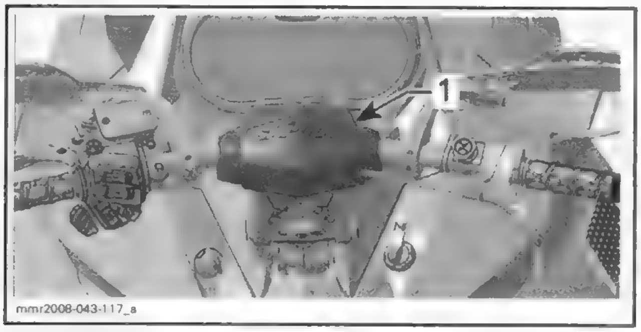
Drain the brake system, refer to *BRAKE FLUID REPLACEMENT* at the beginning of this section.

Remove the Banjo fitting and discard the sealing washers.



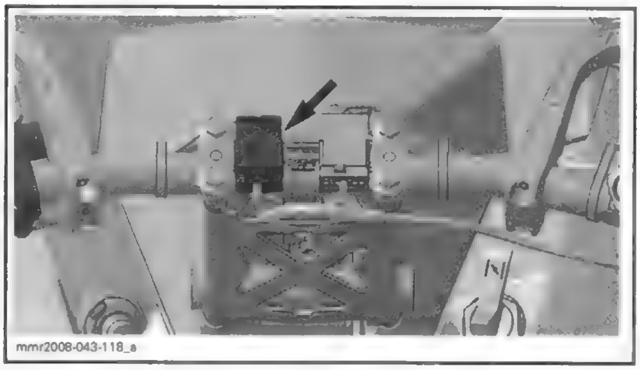
1. *Banjo fitting*
2. *Sealing washers*

Remove steering pad.



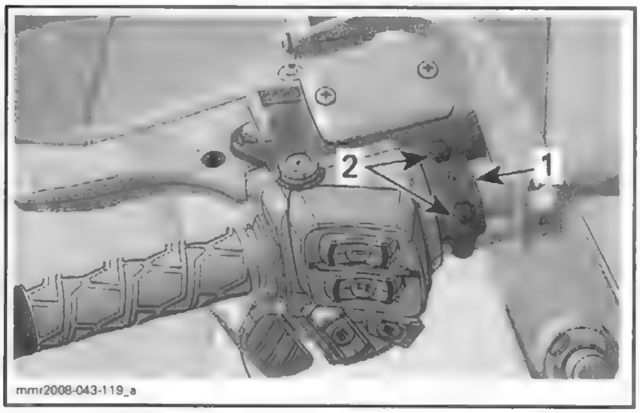
MX Z TNT SHOWN
1. Steering pad

Unplug the LH connector.



Cut locking tie securing brake light switch wiring to handlebar.

Remove screws and clamp securing master cylinder to handlebar.



1. Master cylinder clamp
2. Master cylinder clamp screws

Remove master cylinder.

CAUTION: Do not let master cylinder hangs by the hose and do not stretch or twist the hose.

Master Cylinder Inspection

Discard all remaining fluid inside master cylinder reservoir.

Check if the seal of the reservoir cap is brittle, hard or damaged. Replace if necessary.

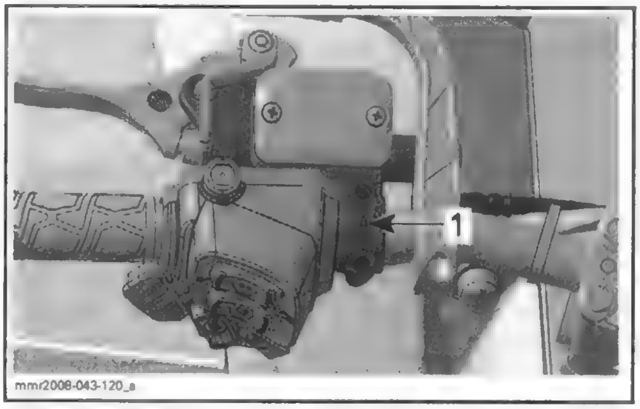
If the reservoir is damaged or leaking, replace master cylinder.

Check if brake lever is bent, cracked or otherwise damaged. Replace brake lever if required.

Master Cylinder Installation

Place the master cylinder on the handlebar.

Install master cylinder clamp with its arrow pointing toward the front of vehicle.



1. Arrow on clamp

Install master cylinder clamp screws and tighten loosely.

With the handlebar is straight ahead position, place the reservoir parallel to the ground.

Tighten brake lever clamp screws to 10 N•m (89 lbf•**in**).

Install the Banjo fitting with two **NEW** sealing washers.

Torque Banjo fitting to 18 N•m (159 lbf•**in**).

Fill and bleed the brake system. Refer to *BRAKE FLUID REPLACEMENT* at the beginning of this section.

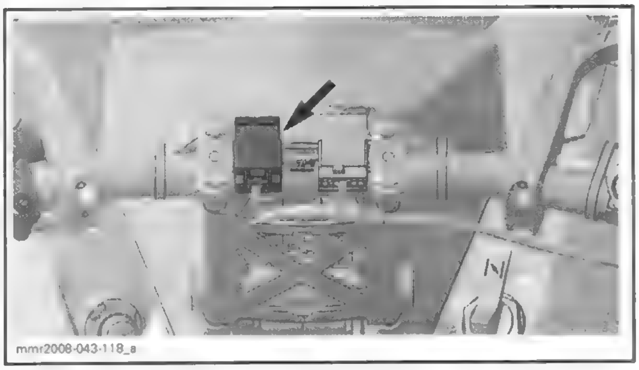
Connect brake light switch connector.

Install steering cover.

BRAKE LIGHT SWITCH

Brake Light Switch Resistance Test

Remove steering cover and unplug the LH connector.



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Validate switch operation with an ohmmeter.

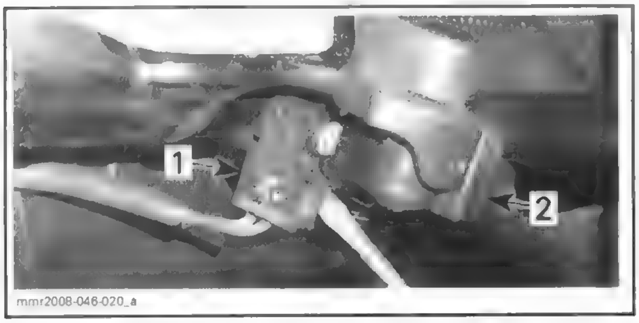
SWITCH	WIRE	RESISTANCE
Released	Pin 3 and pin 4	Infinite (0L)
Pushed and held		0.2 Ω

If readings do not correspond to the above specifications, replace switch.

If readings correspond to the above specifications, check fuse and wiring/connectors going to switch. Repair or replace defective part(s).

Brake Light Switch Removal

Slip a small screwdriver between brake light switch and brake lever and separate them.



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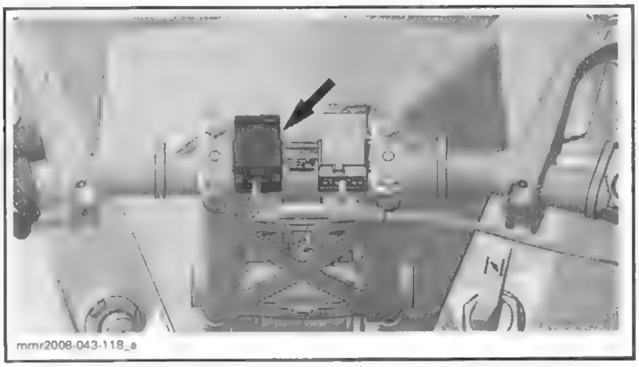
1. *Brake light switch*
2. *Brake lever*

Remove the steering cover and unplug the LH connector.



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Cut all locking ties securing switch wires.

Remove switch wires from connector.

NOTE: Check wires location for reinstallation.

Brake Light Switch Installation

Plug switch wires into connector.

Squeeze brake lever.

Insert the both tabs of switch into brake lever body.

Plug the connector.

Check if switch is working properly.

Install new locking ties and the steering cover.

CHAINCASE

SERVICE TOOLS

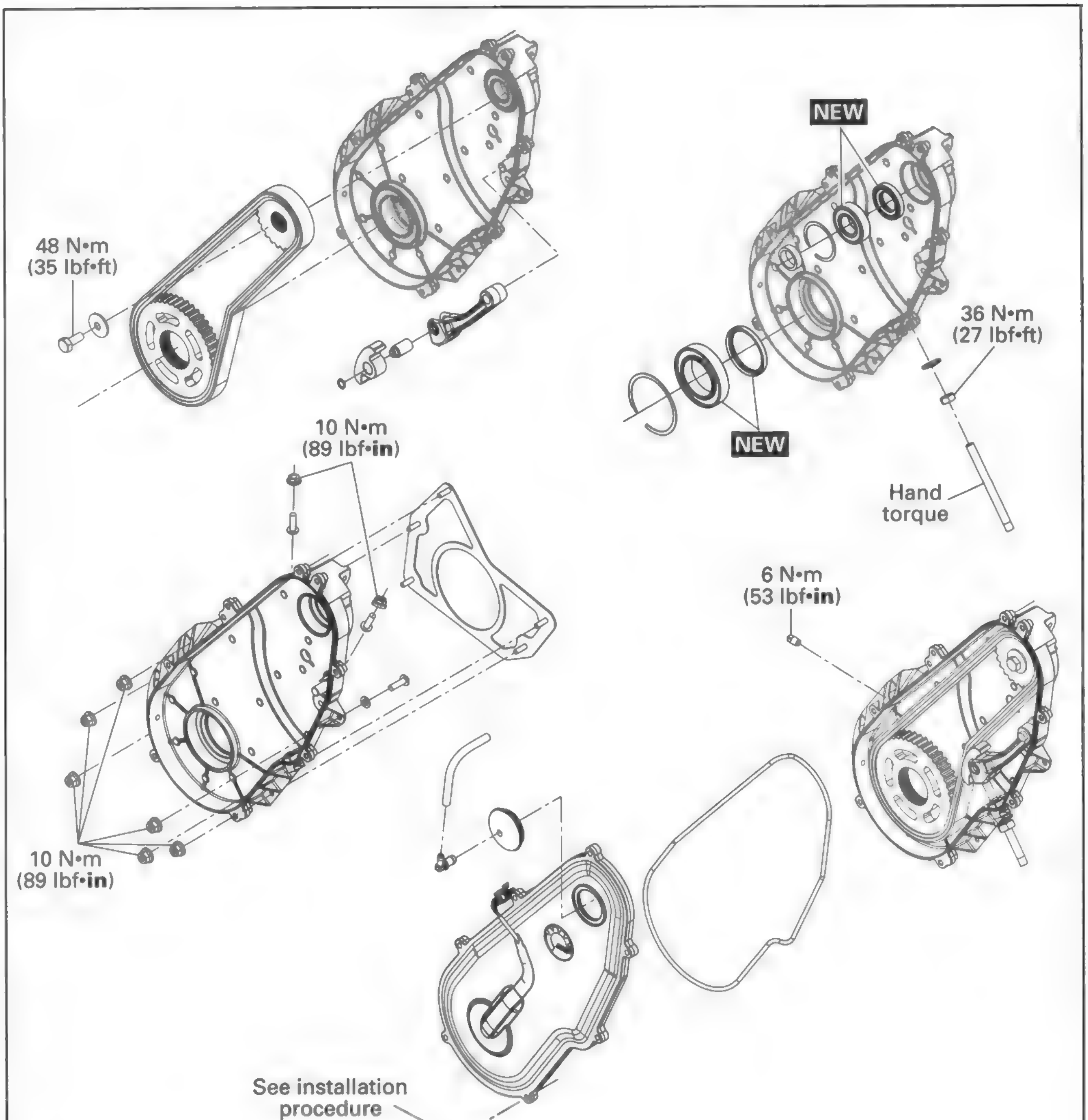
Description	Part Number	Page
Chaincase bearing extractor/installer	529 036 111	402
Chaincase bearing extractor/installer	529 036 112	402

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
Snap-on seal puller	YA105	402

SERVICE PRODUCTS

Description	Part Number	Page
XP-S synthetic chaincase oil	413 803 300	397


48 N•m
(35 lbf•ft)
NEW
36 N•m
(27 lbf•ft)
NEW
Hand torque
10 N•m
(89 lbf•**in**)
6 N•m
(53 lbf•**in**)
10 N•m
(89 lbf•**in**)
See installation procedure
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GENERAL

During assembly/installation, use the torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pin, etc.) must be replaced with new ones.

MAINTENANCE

CHAINCASE OIL

Recommended Oil

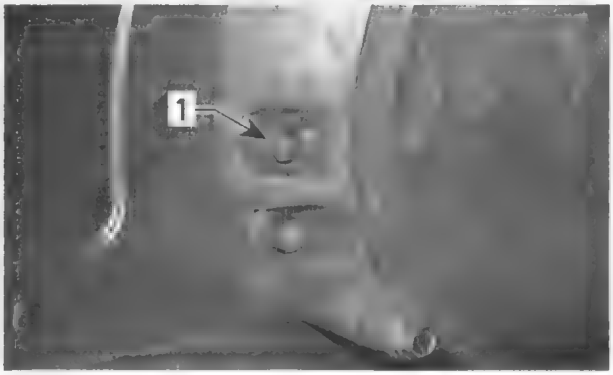
Use XP-S synthetic chaincase oil (P/N 413 803 300).

CAUTION: Use only the recommended type oil when servicing. Do not mix synthetic oil with other types of oil.

Oil Level Verification

Place the vehicle on a level surface.

Remove the magnetic check plug on the left side of chaincase. Oil level must be equal with the lower edge.



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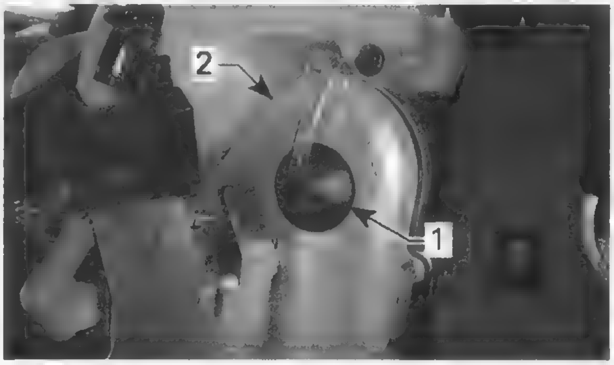
1. Magnetic check plug

Remove metal particles from magnetic check plug.

NOTE: It is normal to find metallic particles stuck to magnetic check plug. If bigger pieces of metal are found, remove the chaincase cover and inspect the chaincase parts.

To add oil, remove the filler cap on chaincase cover.



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1. Filling plug
2. Chaincase cover

Pour recommended oil in chaincase by the filler hole until oil comes out by the magnetic check plug hole.

Reinstall magnetic check plug and torque it to 6 N•m (53 lbf•**in**).

Draining Procedure

Place a drain pan under chaincase drain plug area.

Loosen chaincase cover screws and pull cover.

Wait a while to allow oil to flow out of chaincase.

Filling Procedure

Place the vehicle on a level surface.

Make sure cover is tightened correctly. Refer to *CHAINCASE COVER INSTALLATION*.

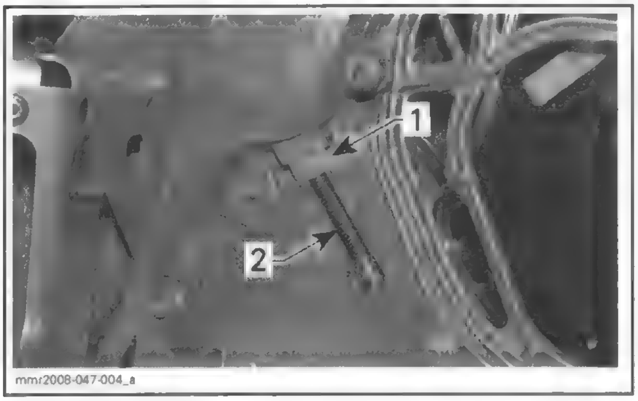
Pour approximately 250 mL (8.5 oz. US) of recommended oil in chaincase by the filler hole until oil comes out by the magnetic check plug hole.

Reinstall magnetic check plug and torque it to 6 N•m (53 lbf•**in**).

DRIVE CHAIN ADJUSTMENT

Remove the muffler. Refer to *EXHAUST SYSTEM*.

Unscrew the lock nut on tensioner adjustment screw.



1. *Lock nut*
2. *Tensioner adjustment screw*

Push back washer with rubber surface.

Tighten tensioner adjustment screw **BY HAND**.

NOTE: Turn adjustment screw until resistance is strong enough that it can not be turned by hand.

Hold tensioner adjustment screw and tighten lock nut to 36 N•m (27 lbf•ft).

PROCEDURES

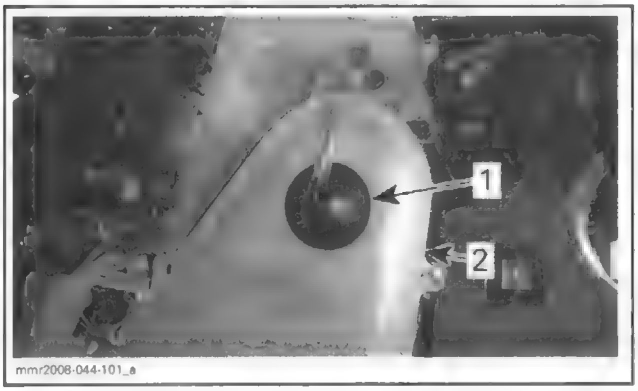
CHAINCASE COVER

Chaincase Cover Removal

Remove the muffler. Refer to *EXHAUST SYSTEM* section.

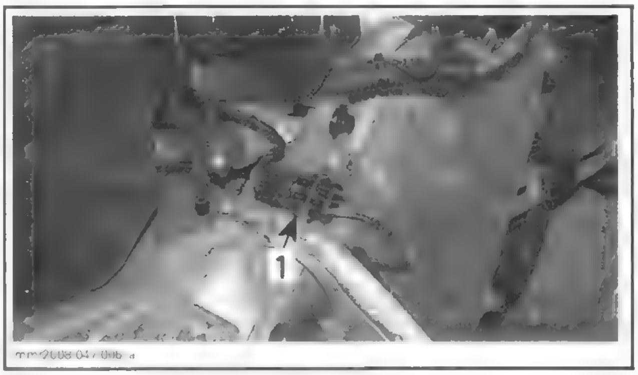
Remove battery and battery rack. Refer to *CHARGING SYSTEM* section.

Remove filling plug.



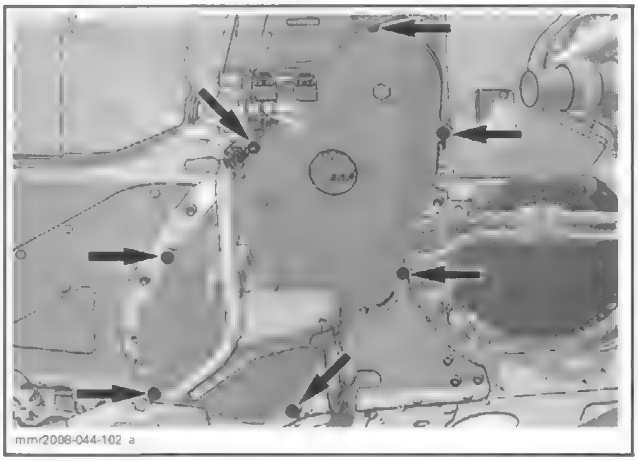
1. *Filling plug*
2. *Chaincase cover*

Disconnect the speed sensor connector.



1. *Speed sensor connector*

Unscrew and remove chaincase cover screws.



SCREWS LOCATION

Pull cover to remove it.

Chaincase Cover Inspection

Check the cover for cracks or other damages. Replace it if necessary.

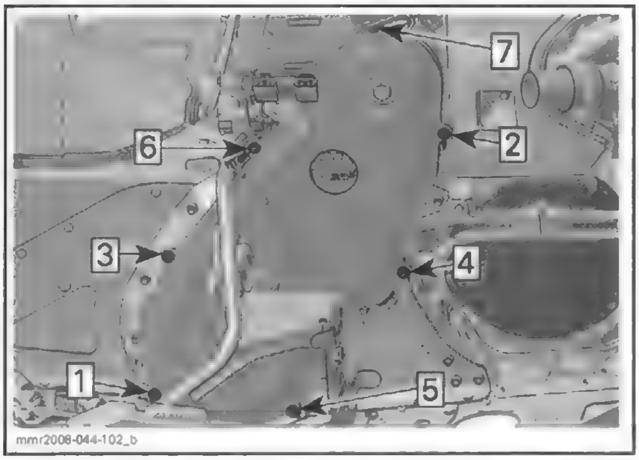
Check if O-ring inside cover is brittle, hard or damaged. Replace it if necessary.

Chaincase Cover Installation

The installation is the reverse of the removal procedure. However, pay attention to the following:

Ensure O-ring is positioned correctly in its groove.

Tighten chaincase cover screws in accordance with the following sequence.


7
6
2
3
4
1
5
mmr2008-044-102_b

CHAINCASE COVER SCREWS TORQUE	
Same chaincase	10 N•m (89 lbf•**in**)
NEW chaincase	15 N•m (133 lbf•**in**)

CHAINCASE

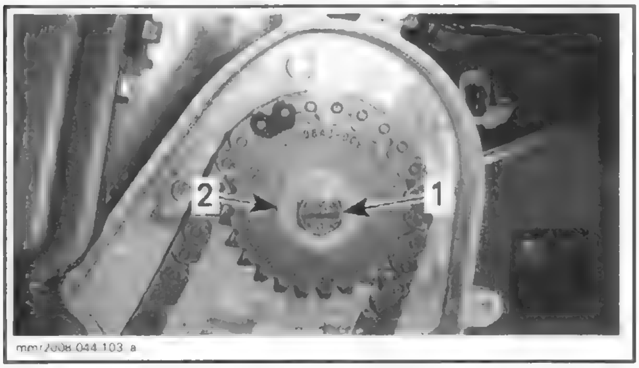
Chaincase Removal

Apply parking brake.

Remove muffler. Refer to *EXHAUST SYSTEM* section.

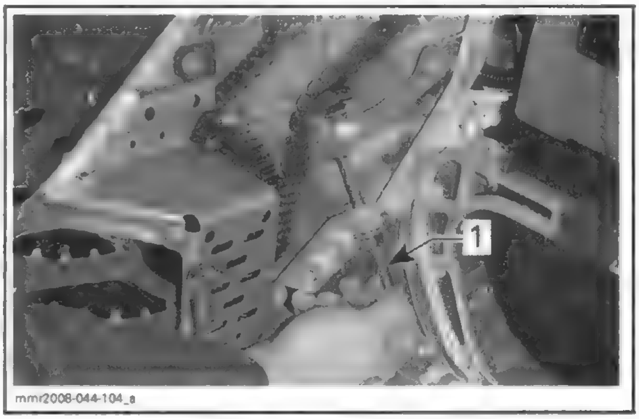
Remove *CHAINCASE COVER*, see procedure in this section.

Remove the upper sprocket screw and its conical spring washer.


2
1
mmr2008-044-103_a

1. *Upper socket*
2. *Conical spring washer*

Release tension from drive chain by unscrewing the tensioner adjustment screw.


1
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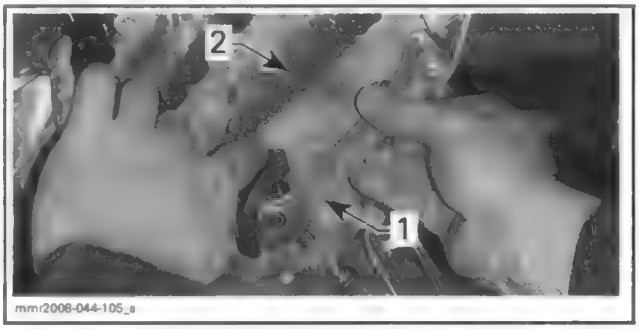
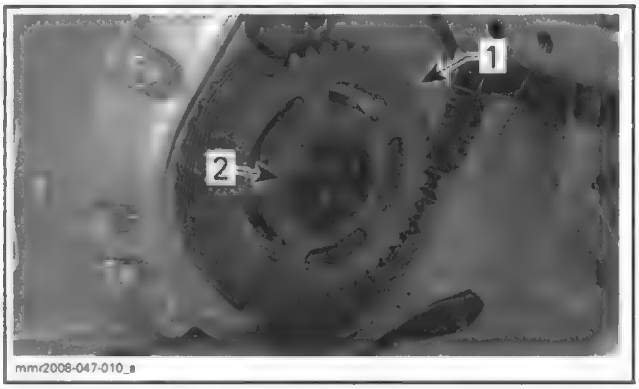
1. *Tensioner adjustment screw*

Remove tensioner arm.


2
1
mmr2008-044-105_a

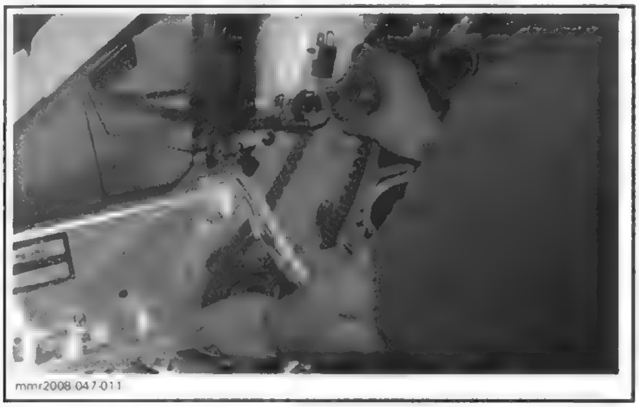
1. *Tensioner arm*
2. *Drive chain*

Remove the lower sprocket circlip.


1
2
mmr2008-047-010_a

1. *Lower sprocket*
2. *Circlip*

Remove the upper sprocket, lower sprocket and drive chain simultaneously.



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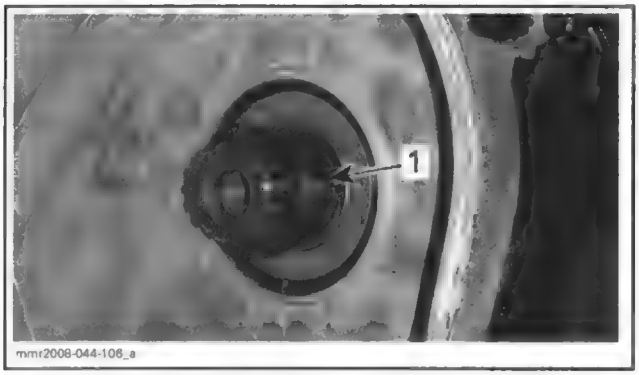
Remove the countershaft spacer.



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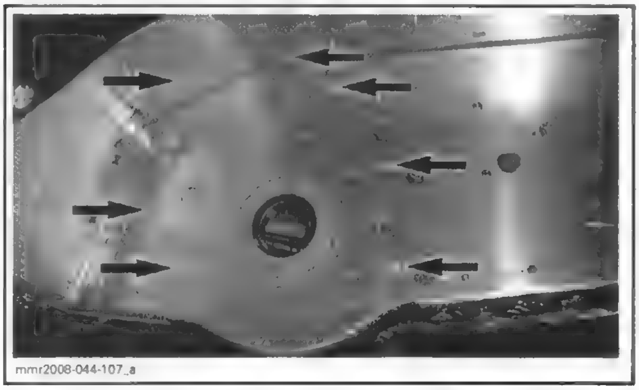
1. *Countershaft spacer*

Remove drive axle. Refer to *DRIVE AXLE* section.

Remove countershaft. Refer to *DRIVEN PULLEY AND COUNTERSHAFT* section.

Remove bolts securing the injection oil reservoir. Refer to *LUBRICATION SYSTEM* section.

Using a small angle grinder, remove the following rivet heads.



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Using a 1/4 in dill bit, remove rivet located on right side of chaincase.

mmr2008-044-108

Unscrew bolt behind the top of chaincase.

Remove chaincase from vehicle.

Using 2 large prybars inserted between chaincase and frame, pry chaincase out of vehicle.

Chaincase Inspection

Visually inspect the chain and spockets for:

- Wear
- Cracks
- Damages teeth
- Missing links.

If a problem is detected, replace drive chain and sprockets as an assembly.

Check the drive chain deflection.

If the deflection is greater than 38 mm (1-1/2 in) without the chain tensioner, replace the chain.

Check for worn or defective bearings.

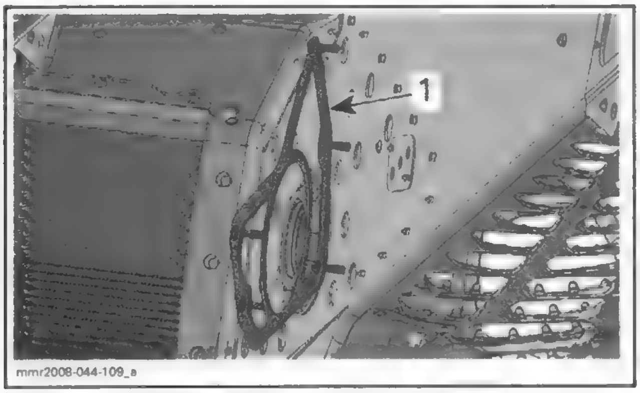
Check chain tensioner slider for wear or other damages.

Chaincase Installation

To install the chaincase, have the following parts in hands:

PARTS TO INSTALL CHAINCASE		
QTY	FASTENERS	P/N
1	Mounting plate	518 325 816
2	M6 x 20 hexagonal flanged bolt	207 662 034
7	M6 elastic flanged nut	233 261 434

Install the mounting plate.



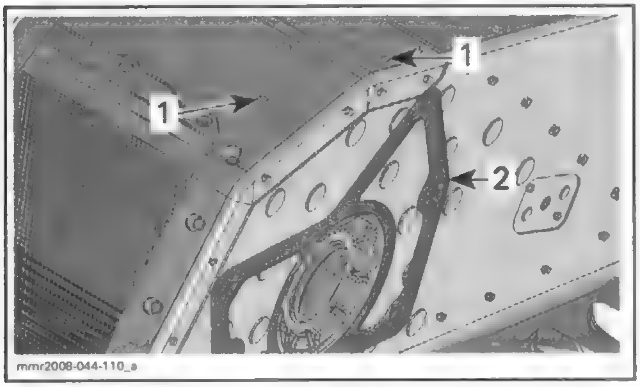
UNDERNEATH FRAME
1. *Mounting plate*

Install the chaincase.

Install 5 elastic flanged nuts to secure chaincase.

NOTE: Unless otherwise noted, bolts and nuts holding the chaincase must be installed loosely FIRST.

Install 2 flanged bolts and secure with elastic flanged nuts.



1. *Install bolt here*
2. *Mounting plate*

Install a flange bolt to securing chaincase to RH side member.

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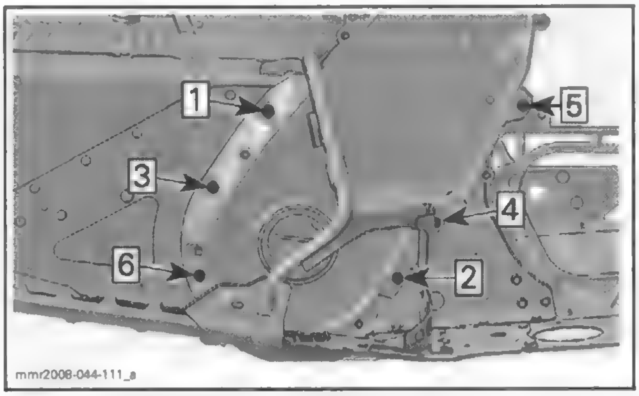
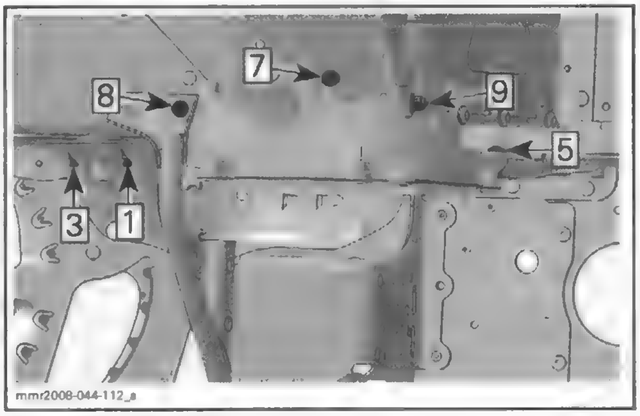
NUT LOCATED OUTSIDE

Install bolt behind the top of chaincase.

Using the following sequence, tighten all nuts to 10 N•m (89 lbf•**in**).



VIEW FROM THE SIDE



VIEW FROM THE TOP

Install all other removed parts.

Make sure to install sprockets with their inscriptions outward.

Install the conical spring washer on the upper socket with its concave side toward sprocket.

Torque upper sprocket screw to 48 N•m (35 lbf•ft).

Install the *CHAINCASE COVER*, see procedure in this section.

Refill the chaincase, refer to *CHAINCASE OIL* above in this section.

Adjust drive chain. Refer to *DRIVE CHAIN ADJUSTMENT* in this section.

CHAINCASE BEARING

NOTE: This procedure can be applied either for the countershaft bearing or the drive shaft bearing.

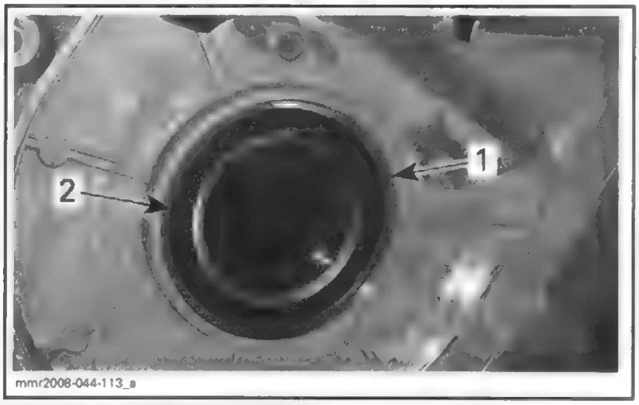
Chaincase Bearing Removal

Remove chaincase cover.

Remove both sprockets and drive chain. Refer to *CHAINCASE REMOVAL*.

Remove the countershaft or the drive axle, depending which bearing is replaced. Refer to appropriate section, *DRIVEN PULLEY AND COUNTERSHAFT* or *DRIVE AXLE*.

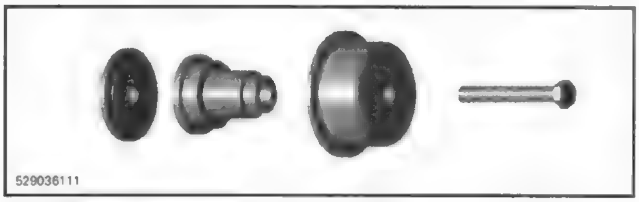
Remove the snap ring securing bearing into chaincase.



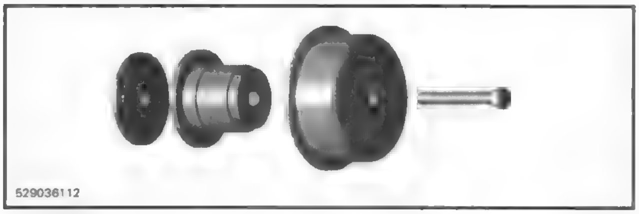
DRIVE AXLE BEARING SHOWN
1. *Snap ring*
2. *Bearing*

Install the appropriate bearing extractor:

BEARING	TOOL
Countershaft	Chaincase bearing extractor/installer (P/N 529 036 111)
Drive axle	Chaincase bearing extractor/installer (P/N 529 036 112)

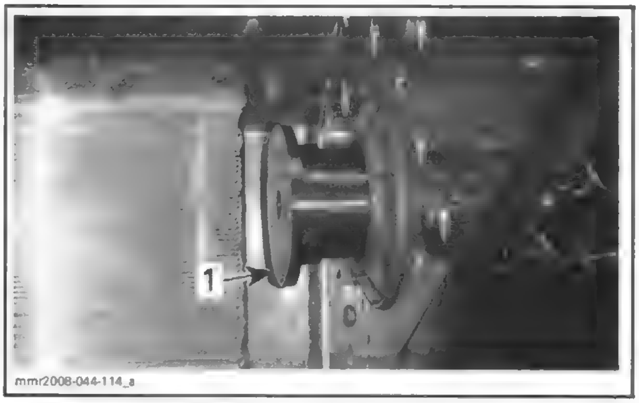


COUNTERSHAFT



DRIVE AXLE

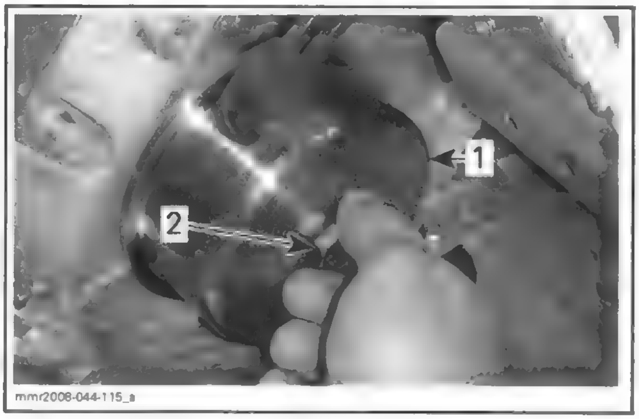
Install the extractor/installer tool behind the bearing.



1. *Extractor/installer tool*

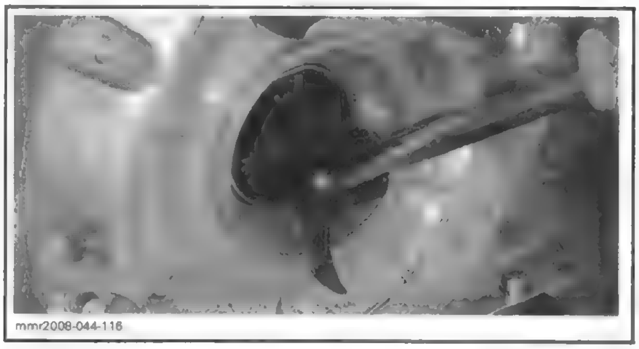
Install the extractor cup over bearing.

Tighten the extractor/installer tool screw to remove the bearing.



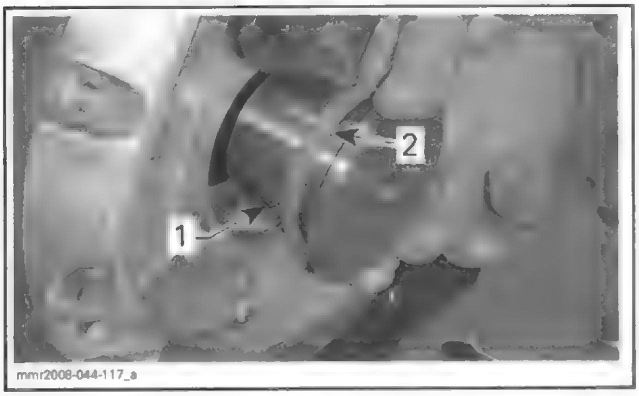
1. *Extractor cup*
2. *Tighten to remove bearing*

Using a seal puller such as the Snap-on seal puller (P/N YA105), remove and discard the oil seal.



Chaincase Bearing Installation

Install the **NEW** oil seal on the extractor/installer tool. Position the lips toward bearing.


1
2
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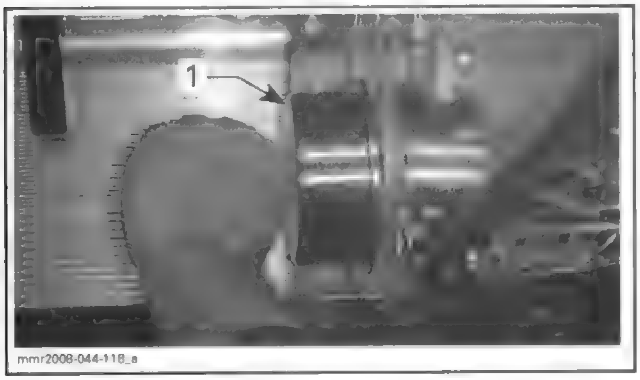
1. *Extractor/installer tool*
2. *Oil seal lips on this side*

Install the extractor cup inside frame.


1
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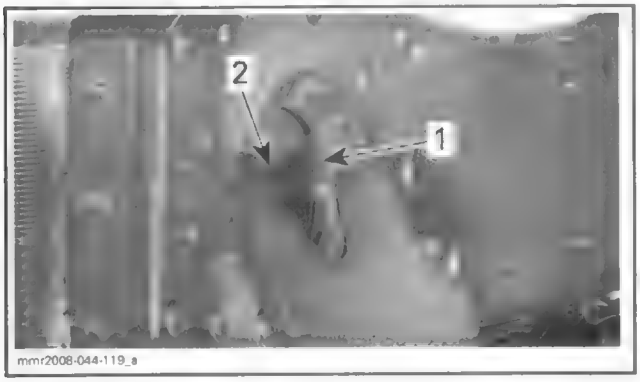
1. *Extractor cup*

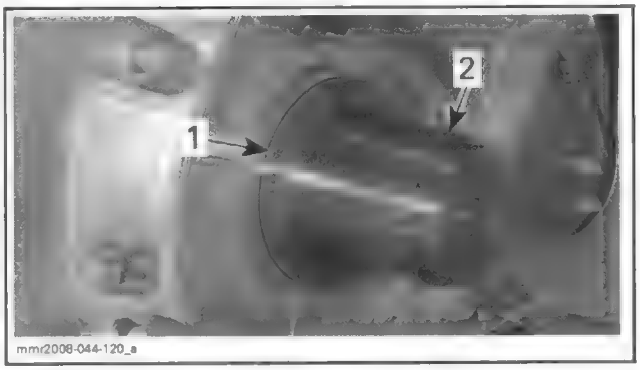
Tighten the extractor/installer tool screw to install the oil seal.

Install the large washer and the extractor/installer tool screw inside frame.


2
1
mmr2008-044-119_a

1. *Large washer*
2. *Extractor/installer tool screw*

In chaincase, install **NEW** bearing and the extractor/installer tool.


2
1
mmr2008-044-120_a

1. *Bearing*
2. *Extractor/installer tool*

Tighten the extractor/installer tool screw to install the bearing.

Remove tool.

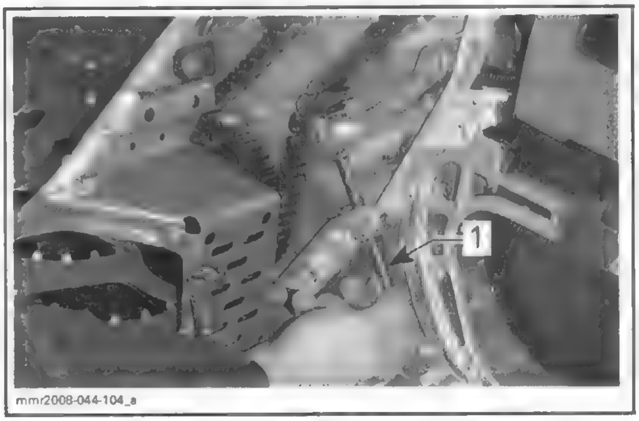
Install all other removed parts.

CHAIN TENSIONER

Chain Tensioner Removal

Remove the *CHAINCASE COVER*, see procedure in this section.

Release tension from drive chain by unscrewing the tensioner adjustment screw.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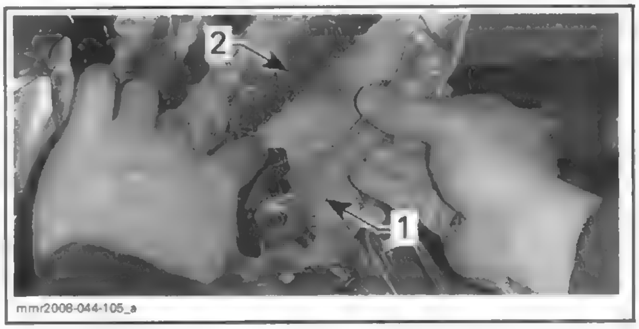
1. *Tensioner adjustment screw*

Remove tensioner arm.


2
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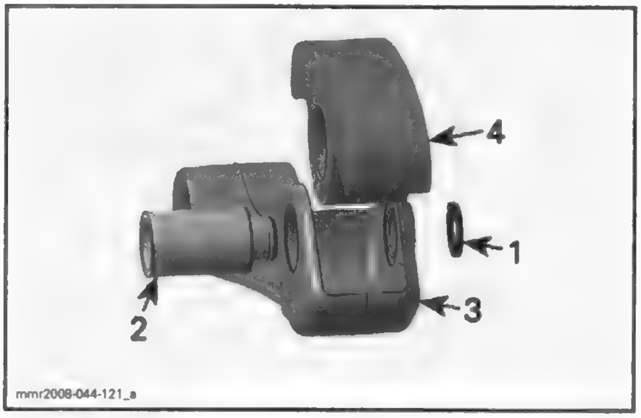
1. *Tensioner arm*
2. *Drive chain*

Chain Tensioner Disassembly

Remove the shaft ring securing the tensioner shaft to tensioner arm.

Remove the tensioner shaft to remove the slider.



1. Shaft ring
2. Tensioner shaft
3. Tensioner arm
4. Slider

Chain Tensioner Inspection

Check chain tensioner slider for wear or other damages. Replace if necessary.

Check threads of tensioner adjustment screw for damages or wear.

Replace screw if necessary and check chaincase for damages.

Check rubber washer condition, replace as required.

Chain Tensioner Assembly

The assembly is the reverse of the disassembly.

NOTE: When assembly is completed, make sure circlip turns freely and slider moves easily.

Chain Tensioner Installation

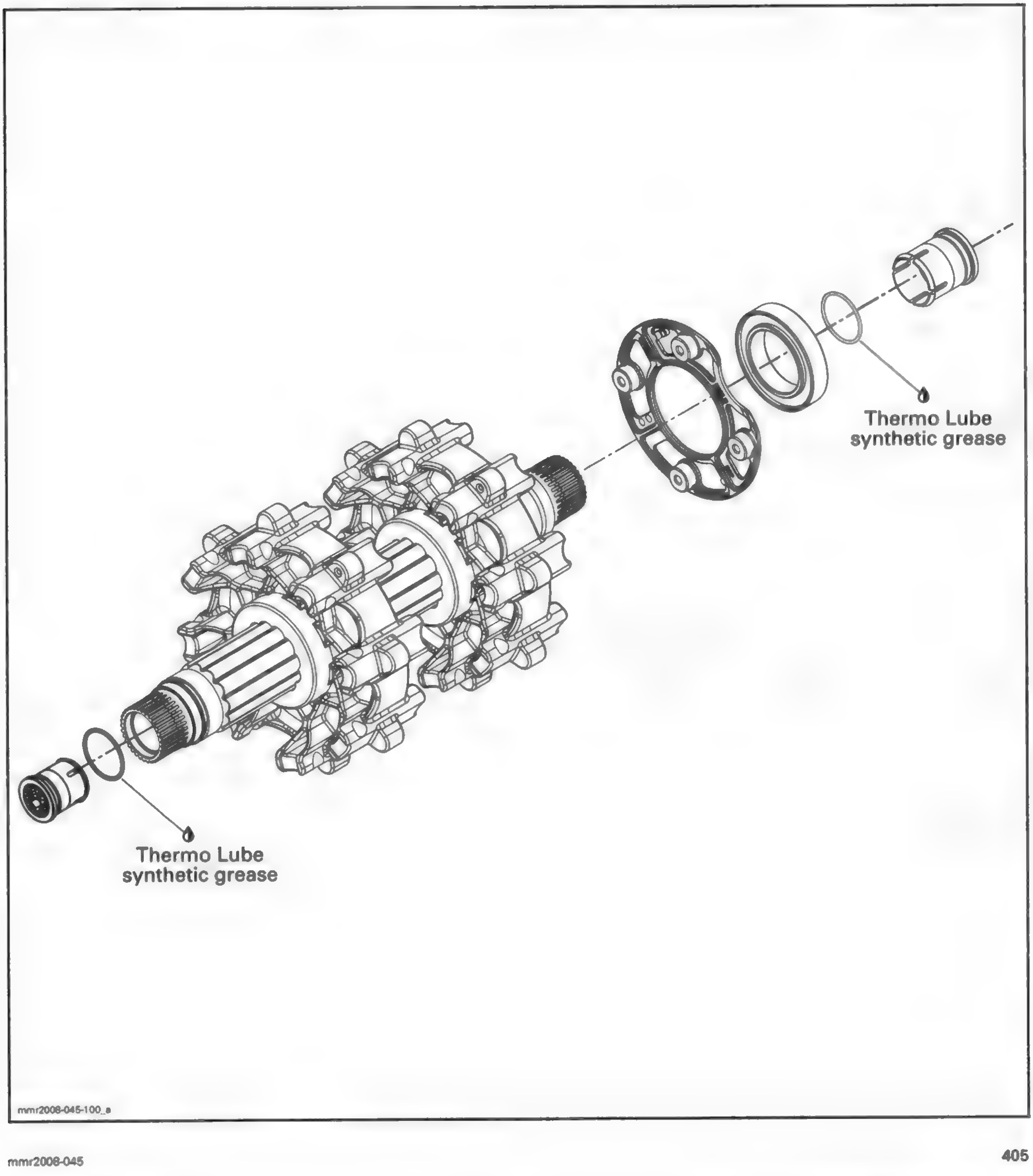
The installation is the reverse of the removal procedure.

Adjust drive chain tension. Refer to *DRIVE CHAIN ADJUSTMENT* at the beginning of this section.

DRIVE AXLE

SERVICE PRODUCTS

Description	Part Number	Page
Thermo Lube synthetic grease	219 700 417	408


Thermo Lube synthetic grease
Thermo Lube synthetic grease
mmr2008-045-100_a

GENERAL

During assembly/installation, use torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pins, etc.) must be replaced with new ones.

PROCEDURES

DRIVE AXLE

Drive Axle Removal

Remove the rear suspension. Refer to *REAR SUSPENSION* section.

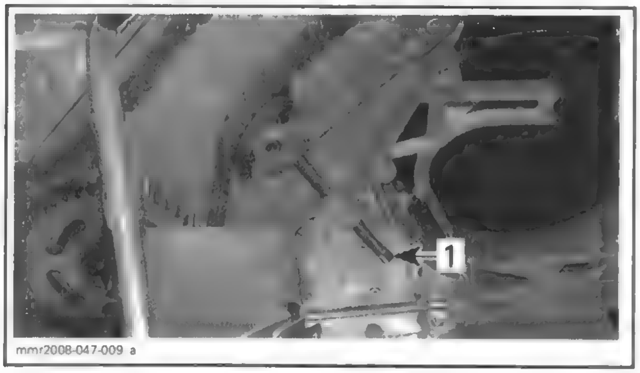
On LH Side

Remove the caliper. Refer to *BRAKE* section.

On RH Side

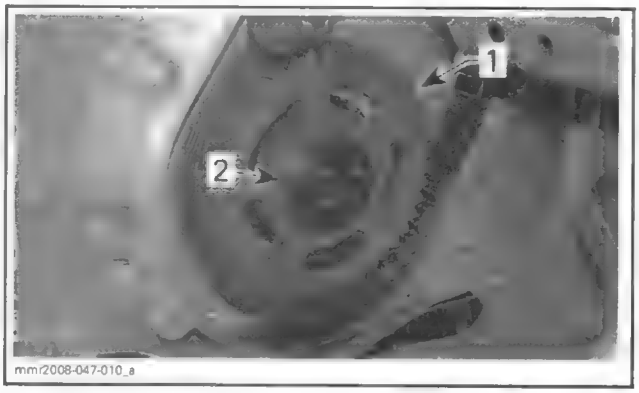
Remove the chaincase cover. Refer to *CHAINCASE* section.

Release tension from drive chain by unscrewing the tensioner adjustment screw.



1. Tensioner adjustment screw

Remove the lower sprocket circlip.

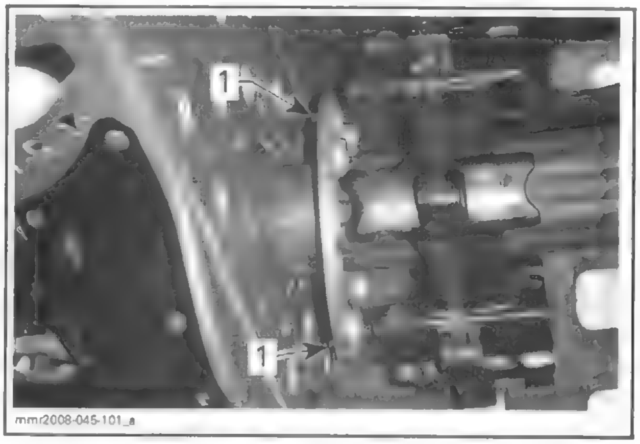


1. Lower sprocket
2. Circlip

Remove lower gear and drive chain.

Under Frame

Turn the LH bearing flange counterclockwise to unlock it from frame.



1. Bearing flange locking tabs

Release drive axle sprockets from track and at the same time, push the drive axle toward the **LEFT** side.

Move the drive axle towards the right side to remove it from vehicle.

Drive Axle Inspection

Replace drive axle if one of the following situations is detected:

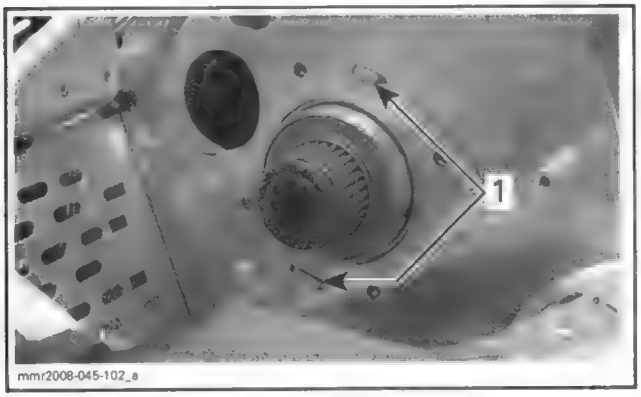
- Cracked, worn or damaged drive axle
- Worn or damaged drive axle splines
- Worn or damaged sprockets
- Worn bearing journal.

Drive Axle Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install drive axle then lock the bearing flange on frame.

NOTE: Ensure bearing flange is properly locked. Tabs must be properly inserted in frame.



VIEW FROM OUTSIDE FRAME
1. Bearing flange locking tabs

To install the caliper and the disc brake, refer to *BRAKE* section for the specific procedure.

Install all other removed parts. Refer to the appropriate sections.

DRIVE AXLE BEARING

Drive Axle Bearing Inspection

Before removing bearing from drive axle, check if it turns smoothly and freely. Replace bearing if necessary.

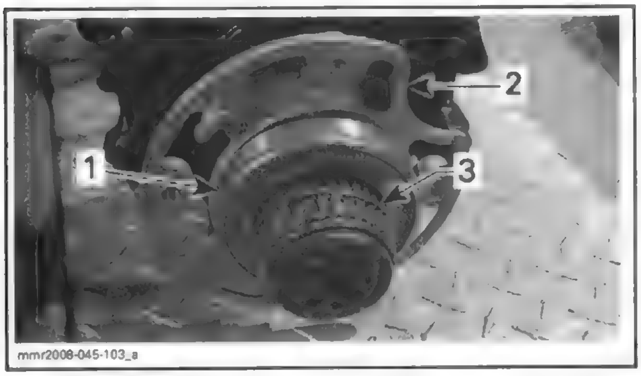
Check if bearing seals are not damaged. Replace bearing if necessary.

Check if the bearing flange is cracked, bent or otherwise damaged. Replace it if required.

Drive Axle Bearing Removal

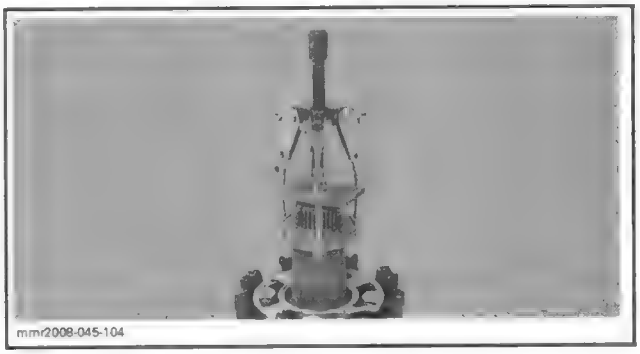
Remove *DRIVE AXLE*, see procedure above.

Remove the O-ring.



1. Drive axle bearing
2. Bearing flange
3. O-ring

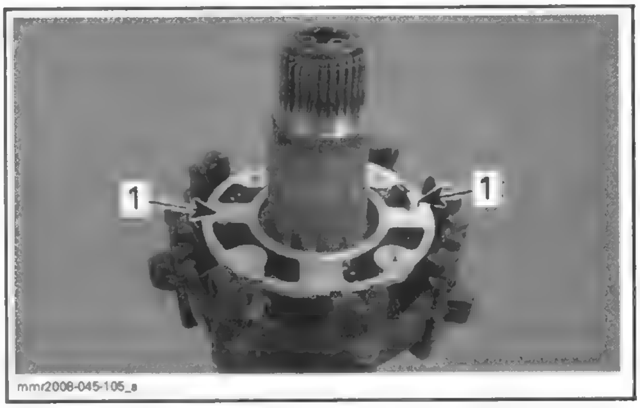
Using a puller, remove the drive axle bearing.



Remove the bearing flange.

Drive Axle Bearing Installation

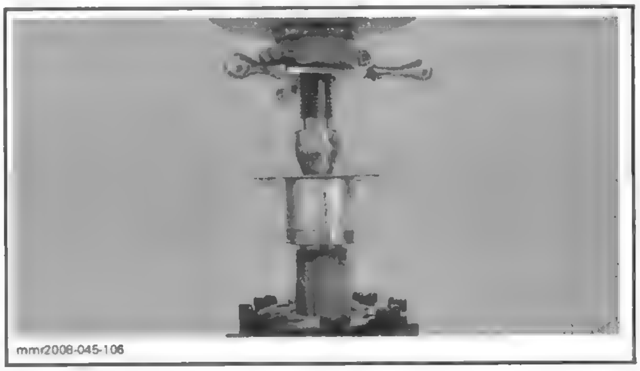
Install bearing flange on drive axle.



1. Locking tabs outwards

Using a press and a suitable pipe, push the bearing.

CAUTION: Always push the bearing by inner race.



Install drive axle and all other removed parts.

MAGNETIC CAP

Magnetic Cap Removal

Remove brake disc protective cover. Refer to *BRAKE* section.

Remove the chaincase cover. Refer to *CHAINCASE* section.

Using two screwdrivers or pliers, pry or pull the magnetic cap out of drive axle end.

Discard the magnetic cap.

Magnetic Cap Installation

Apply Thermo Lube synthetic grease (P/N 219 700 417) on O-ring.

Insert the magnetic cap into drive axle.

Install all other removed parts.

TRACK

SERVICE TOOLS

Description	Part Number	Page
belt tension tester	414 348 200	410
narrow-cleat installer	529 036 044	409

TRACK

Track Inspection

Visually inspect track for:

- Cuts and abnormal wear
- Broken rods
- Broken or missing track cleats
- Perforations in the track
- Tears in the track (particularly around traction product holes)
- Lugs that are broken or torn off, exposing portion of rods
- Delamination of the rubber
- Broken studs
- Bent studs
- Studs that are torn off the track
- Missing track guide(s).

If track is damaged or rods are broken, replace track. For damaged or missing cleats, replace by new ones.

⚠ WARNING

Do not operate a snowmobile with a cut, torn or damaged track.

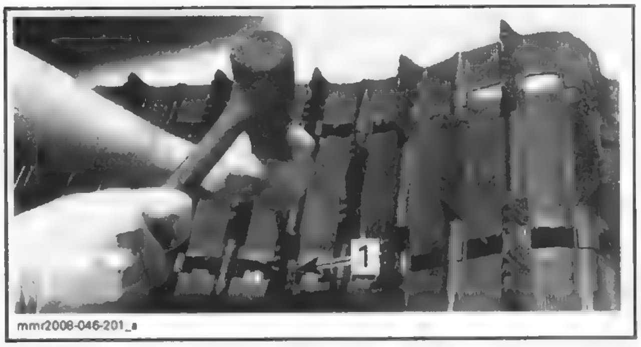
Track Cleat Replacement

Raise rear of vehicle off the ground.

Lift snow guard.

Rotate track to expose a cleat to be replaced.

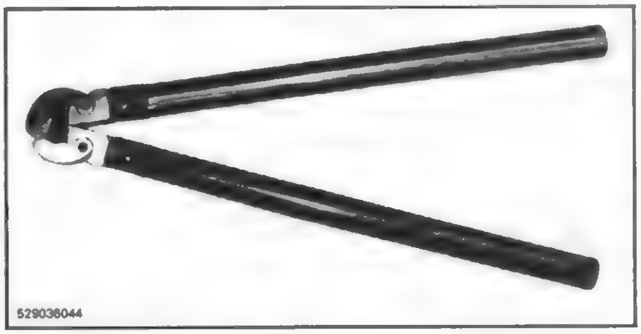
Remove cleat from track using plastic hammer and a big screwdriver.



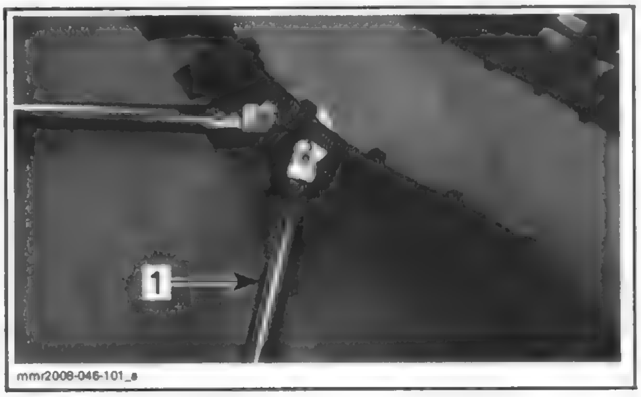
TYPICAL
1. Cleat

Place new cleat in position on the track.

Secure cleat using the narrow-cleat installer (P/N 529 036 044).



Bend cleat and push tabs into rubber.



TYPICAL
1. Narrow-cleat installer

Reopen narrow-cleat installer.

Position cleat tabs on open end of tool.

Squeeze tabs until they are indented in rubber.

Track Removal

Remove rear suspension from vehicle. Refer to *REAR SUSPENSION*.

Remove track from rear suspension.

Track Installation

Reverse the removal procedure.

NOTE: When installing the track, respect rotation direction indicated by an arrow on track thread.

1
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1. *Arrow pointing forwards*

Track Adjustment

Track tension and alignment are interrelated. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

Tension

NOTE: After track adjustment, ride the snowmobile in snow about 15 to 20 minutes and recheck track tension.

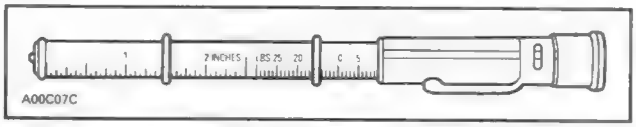
Lift snowmobile by a rope, chain or lift strap hooked to rear bumper.

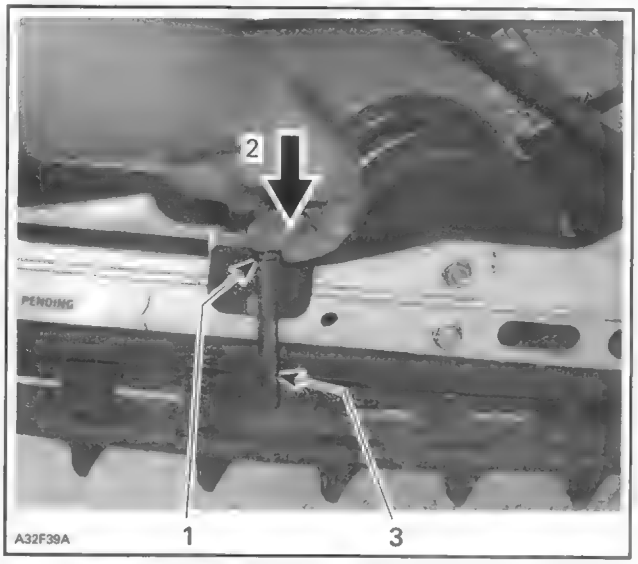
Allow the rear suspension to fully extend and check gap halfway between front and rear idler wheels.

Measure between slider shoe bottom and inside of track. The gap should be as given in the following table.

TRACK ADJUSTMENT	
Track adjustment force	7.3 kgf (16 lbf)
Track deflection	30 to 35 mm (1.181 to 1.378 in)

The belt tension tester (P/N 414 348 200) may be used to measure deflection as well as force applied.



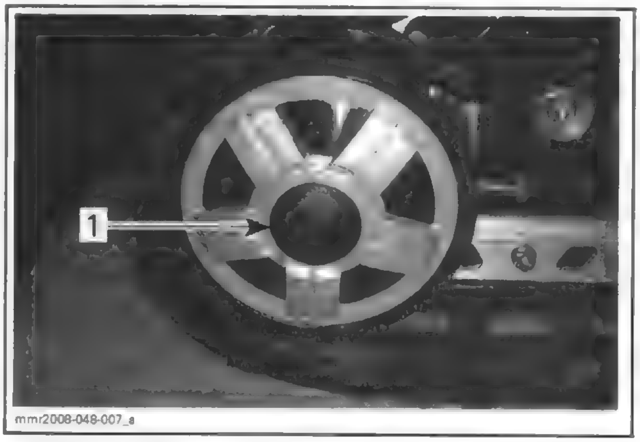


1. *Tool top O-ring positioned at 7.3 kgf (16 lbf)*
2. *Apply pressure on tool until it contacts the upper O-ring*
3. *Measured track deflection*

CAUTION: Too much tension will result in power loss and excessive stresses on suspension components.

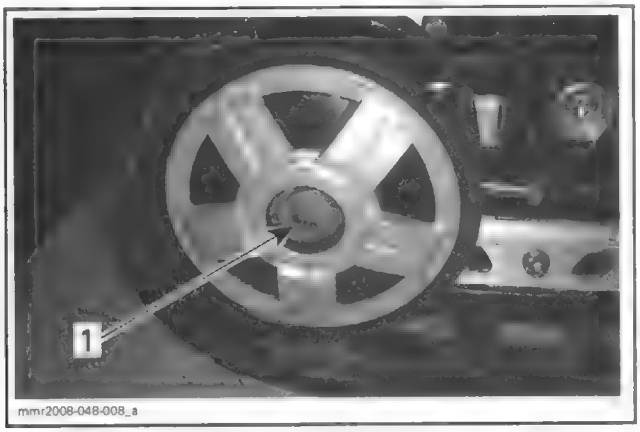
To adjust tension, do the following:

- Lift rear of vehicle and support it off the ground.
- Remove rear idler wheel caps.



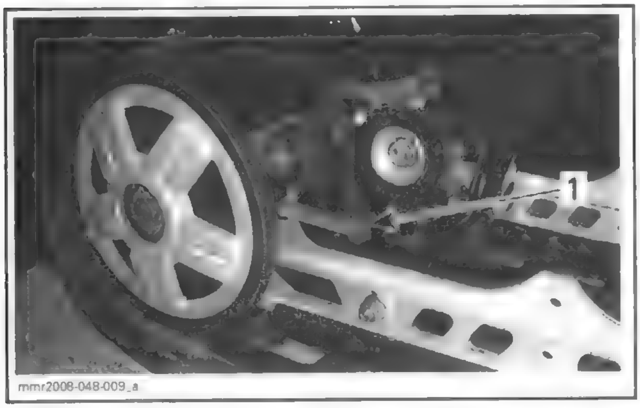
1. *RH rear idler wheel cap*

- Unscrew and remove rear axle screws (one each side).



1. *RH rear axle screw*

- Tighten or loosen both adjustment screws to increase or decrease track tension.



1. *RH adjustment screw*

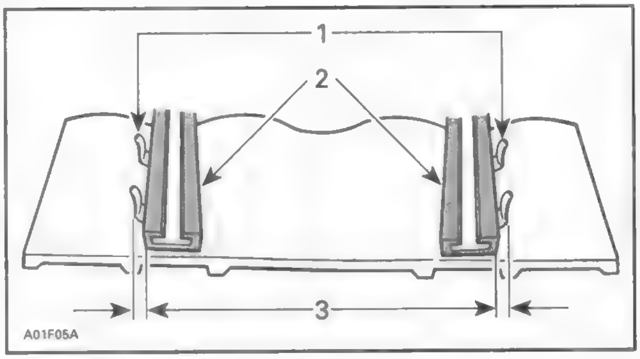
Alignment

⚠ WARNING

Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle. Never rotate at high speed.

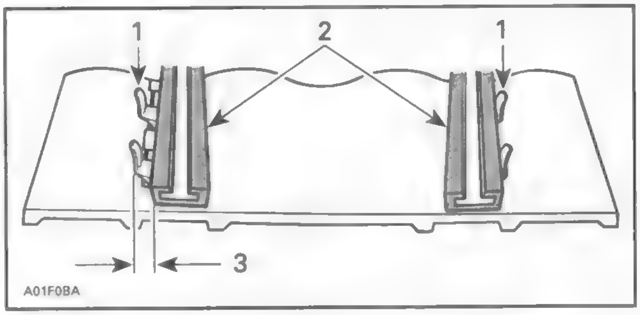
Start the engine and accelerate slightly so that track barely turns. This must be done in a short period of time (1 to 2 minutes).

Check that the track is well centered; equal distance on both sides between edges of track guides and slider shoes.



1. *Guides*
2. *Slider shoes*
3. *Equal distance*

To correct, stop engine, loosen rear wheel screws, then tighten the adjustment screw on side where the slider shoe is the farthest from the track insert guides.



1. *Guides*
2. *Slider shoes*
3. *Tighten on this side*

Restart engine, rotate track slowly and recheck alignment.

If the satisfactory alignment is achieved, then tighten the idler wheel retaining screws to 48 N•m (35 lbf•ft).

Reinstall the wheel caps.

TRACTION ENHANCING PRODUCTS (STUDS)

Important Safety Rules

All REV-XP tracks use special single ply of fabric track to reduce weight and rolling resistance. The conventional track design is a 2 layers of fabric and one layer of high strength tensile cord. The new REV-XP tracks design is a single layer of fabric and one layer of tensile cord. This results in a thinner track and if studded, absolutely requires the use of the 286 Phantom series designed studs.

⚠ WARNING

REV-XP platform require special studs. Use only the 286 phantom series studs and support plates on the REV-XP tracks. The use of other kinds of studs on REV-XP tracks may cause risks of injuries.

⚠ WARNING

Installing an incorrect number of studs or an improper installation could reduce the track life and possibly resulting in serious injury or death.

⚠ WARNING

Never stud a track that has not been approved for studs. Installing studs on an unapproved track could increase the risk of the track tearing or severing, possibly resulting in serious injury or death. Approved tracks can be identified by a stud symbol molded into the track surface.

Studs should only be installed in the locations indicated by molded bulges in the track surface.

Never stud a track with a profile of 35 mm (1.375 in) or more.

The maximum allowable stud penetration range is 6.4 to 9.5 mm (1/4 to 3/8").

The number of studs installed must match the number of molded bulges in the track.

Strictly adhere to the specified tightening torque.

⚠ WARNING

To prevent serious injury to individuals near the snowmobile:

- **NEVER stand behind or near a moving track.**
- **ALWAYS use a wide-base snowmobile stand with a rear deflector panel.**
- **When the track is raised off the ground, only run it at lowest possible speed.**

Centrifugal force could cause debris, damaged or loose studs, pieces of torn track, or an entire severed track to be violently thrown backwards out of the tunnel with tremendous force, possibly resulting in the loss of a leg or other serious injury.

Effects of Studding on the Life of the Snowmobile

The use of traction enhancing products can increase the load and the stress on certain snowmobile components, as well as the vibration level. This can cause premature wear on parts such as belts, brake lining, bearings, chain, and chaincase sprockets, and shorten track life. For this reason, it is even more important to follow the detailed maintenance program given in the *MAINTENANCE CHART*.

Studs can also cause serious damage to the snowmobile if it is not equipped with the tunnel protectors designed for the particular model. Damage to the electrical wiring or perforation of the heat exchangers are potential hazards, that could cause the engine to overheat and be severely damaged.

Studs and Track Inspection

A visual inspection of the track should be performed before each use. Refer to *TRACK INSPECTION*.

Replace broken or damaged studs immediately. If the track shows signs of deterioration, it must be replaced immediately. In doubt, replace the track.

⚠ WARNING

Riding with a damaged track or studs could lead to loss of control, resulting in a risk of serious injury or death.

Stud Installation Tables

Use the following table for appropriate size and quantity of studs.

APPROVED STUDS ACCORDING TO TRACK LUG HEIGHT			
LUG HEIGHT	STUD SIZE	QTY OF STUDS FOR A 120" TRACK	QTY OF STUDS FOR A 137" TRACK
1.000"	1.075"	84	96
1.250"	1.325"	84	96

Use the following table for appropriate tunnel protector kits.

TUNNEL PROTECTOR KITS		
CHASSIS TYPE	TRACK DIMENSION	KIT P/N
REV-XP	All	860 200 068

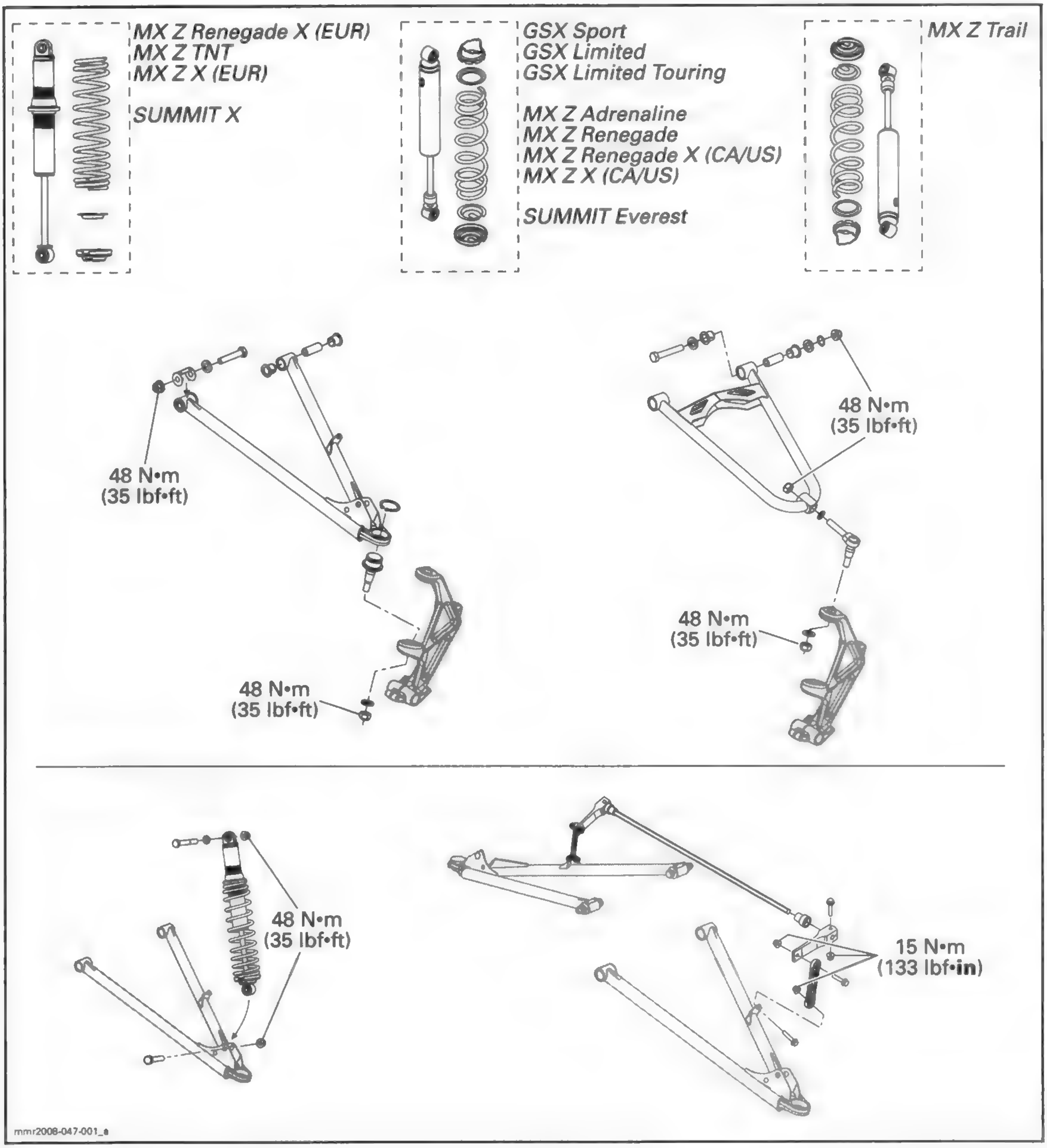
Stud Installation Procedure

Refer to manufacturer's instruction for complete installation procedure.

FRONT SUSPENSION

SERVICE TOOLS

Description	Part Number	Page
ball joint remover	529 035 827	421
ball joint installer	529 035 975	424
spring compressor tool	529 036 007	419
ball joint remover	529 036 121	424


MX Z Renegade X (EUR)
MX Z TNT
MX Z X (EUR)
SUMMIT X
GSX Sport
GSX Limited
GSX Limited Touring
MX Z Adrenaline
MX Z Renegade
MX Z Renegade X (CA/US)
MX Z X (CA/US)
SUMMIT Everest
MX Z Trail
48 N•m (35 lbf•ft)
48 N•m (35 lbf•ft)
48 N•m (35 lbf•ft)
48 N•m (35 lbf•ft)
48 N•m (35 lbf•ft)
48 N•m (35 lbf•ft)
15 N•m (133 lbf•**in**)
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GENERAL

The procedure explained below is the same for the RH and LH sides unless otherwise noted.

During assembly/installation, use torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pins, etc.) must be replaced with new ones.

Check for loose, bent, worn out, rusted or otherwise damaged components. Replace the faulty components.

ADJUSTMENT

SUSPENSION SPRING

SPRINGS ADJUSTMENT GUIDELINE		
HANDLING	STEERING	SOLUTION
Good	Comfortable	No adjustment required
Too soft	Too easy to turn	Increase spring preload
Too hard	Hard to turn	Decrease spring preload

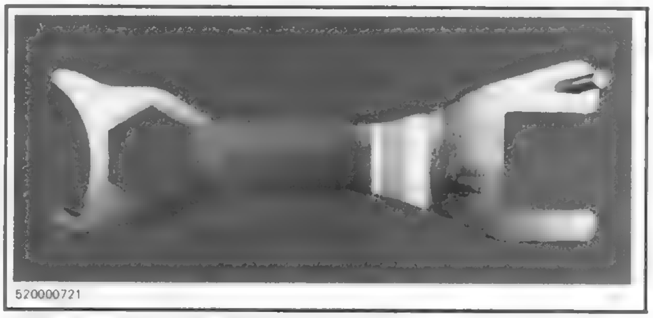
⚠ WARNING

Adjust both springs to the same load. Uneven adjustment can cause poor handling and loss of stability, and/or control, and increase the risk of an accident.

Spring Preload Adjustment

Models with Cam

Using the suspension adjustment tool (included in the tool kit), turn the cam to increase or decrease spring preload.



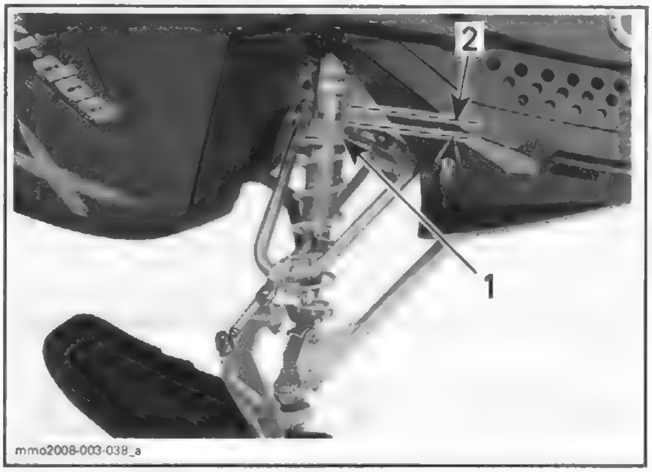
SUSPENSION ADJUSTMENT TOOL

Models with Adjustment Ring

Grab and turn the spring to increase or decrease spring preload.

Screw Type Adjustment

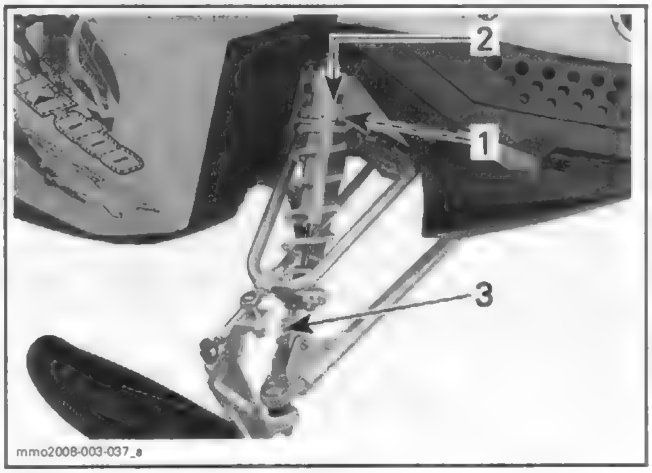
MX Z (Renegade X (Eur), TNT, X (Eur)) and SUMMIT (X)



1. *Adjustment ring*
2. *Ring positions*

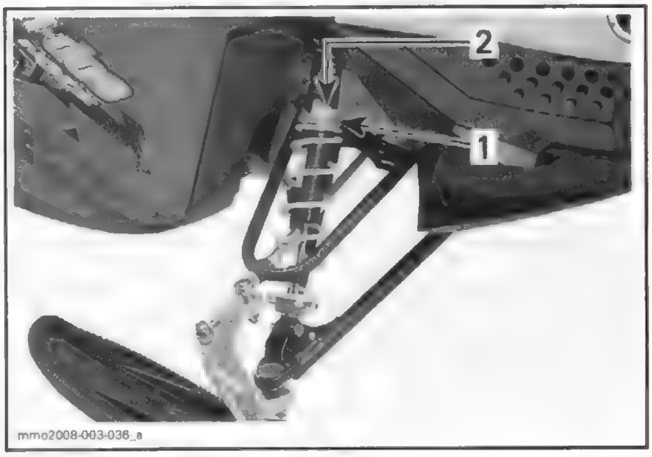
Cam Type Adjustment

MX Z (Renegade X (CA/US), X (CA/US))



1. *Adjustment cam*
2. *Cam positions*
3. *Compression/rebound adjustment*

GSX Series, MX Z (Adrenaline, Renegade, Trail) and SUMMIT (Everest)



1. *Adjustment cam*
2. *Cam positions*

SHOCK ABSORBER

Compression/Rebound Adjustment

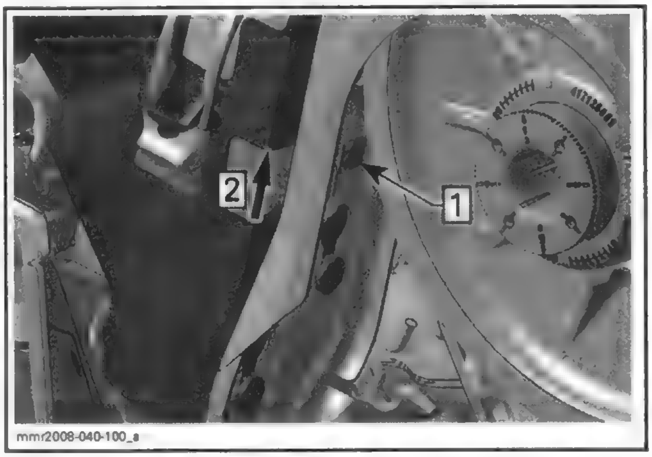
All X Package — CA/US Only

Front shock on the above mentioned models feature a compression/rebound adjustment.

Turn the damping adjuster accordingly. Turning it clockwise increases shock damping action

To remove the RH shock absorber, remove the muffler. Refer to *EXHAUST SYSTEM* section.

To remove the LH shock absorber, remove the tool kit support by pressing the locking tab.



Step 1: *Press tab*
Step 2: *Lift tool kit support*

Lift the front of vehicle until skis are off the ground.

Remove the shock absorber upper bolt.

Check the following conditions that will denote a defective shock:

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme end of either stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension strokes.

If suspecting a shock is freezing, place it in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than one in normal condition.

Renew if any faults are present.

Gas Shock except Variable Rate

Because of gas pressure, strong resistance is felt when compressing shock.

When released, the shock should extend unassisted. The rod speed coming out will go slow - faster and slow again due to the VR zone.

If suspecting a shock is freezing, place it in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than one in normal condition.

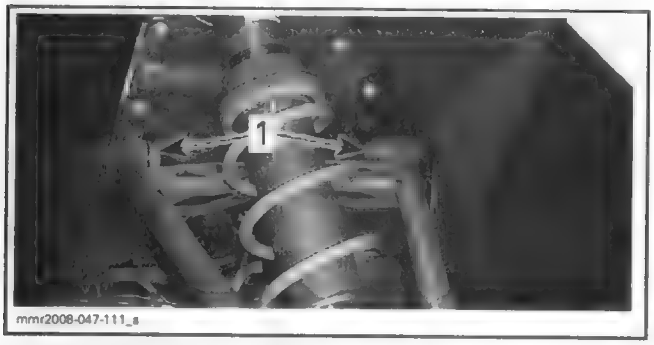
Refer to *REAR SUSPENSION* for servicing procedure.

Shock Absorber Assembly and Installation

For assembly and installation, reverse the disassembly and removal procedures.

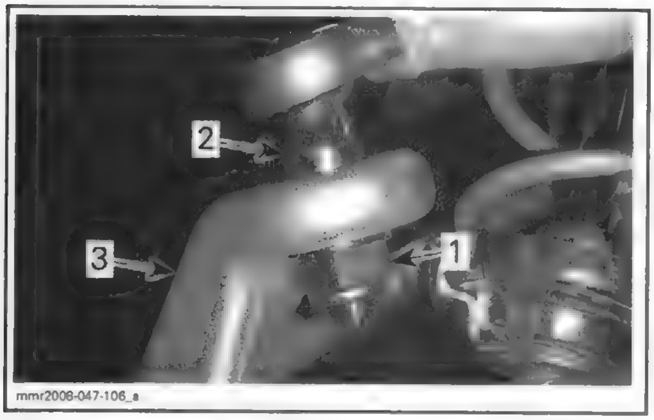
NOTE: Always install shock valve outwards when applicable.

UPPER SUSPENSION ARM



1. Upper suspension arm bolts

Remove ball joint from ski leg. See procedure in *UPPER BALL JOINT REMOVAL* in this section.



1. Ball joint nut
2. Ball joint
3. Ski leg

Remove upper suspension arm.

Upper Suspension Arm Installation

The installation is the reverse of the removal procedure.

UPPER BALL JOINT

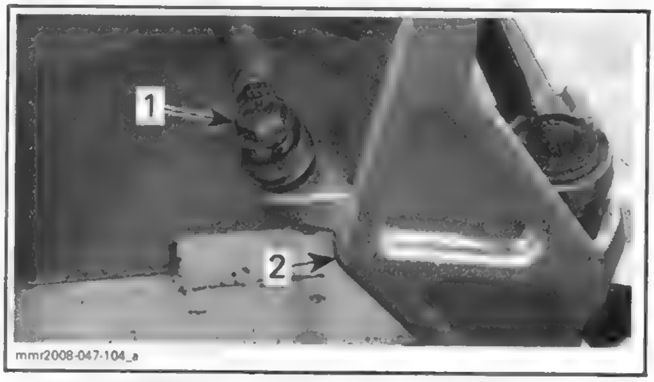
Upper Ball Joint Inspection

Check both upper ball joints for damage, pitting, looseness and roughness. If so, replace with a new one.

Upper Ball Joint Removal

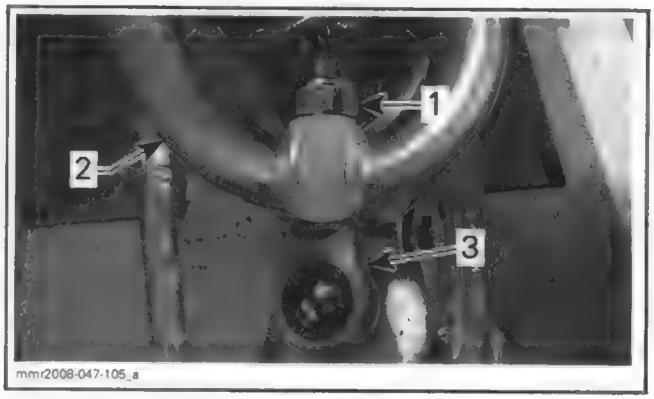
Position upper suspension arm so that ball joint becomes parallel with ski leg.

Detach tie-rod end from ski leg.



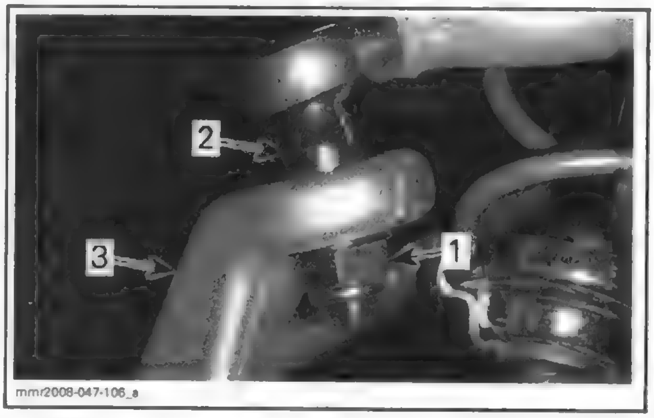
1. Tie-rod end bolt
2. Ski leg

Unscrew nut retaining ball joint housing to upper suspension arm.



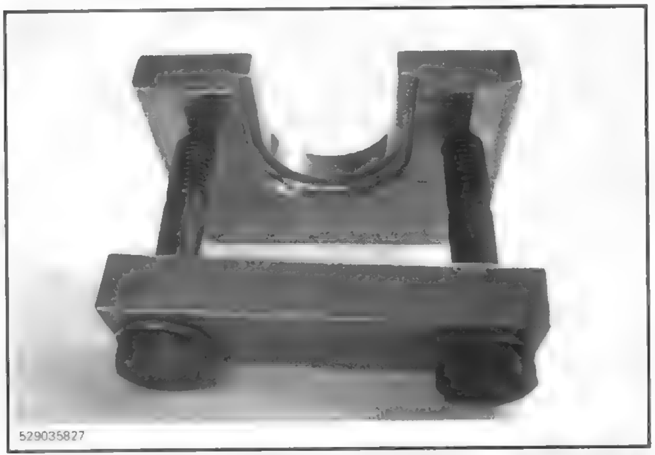
1. Ball joint housing nut
2. Upper suspension arm
3. Ball joint housing

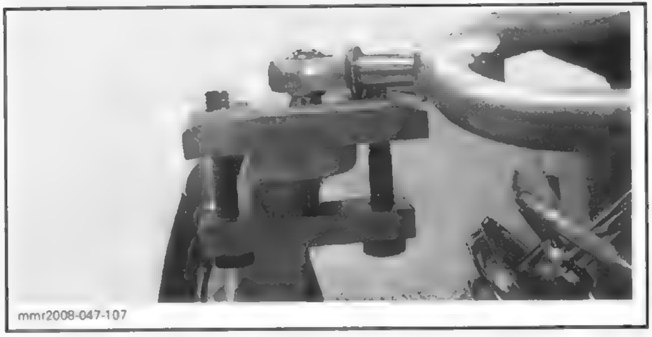
Remove nut securing ball joint to ski leg.



1. Ball joint nut
2. Ball joint
3. Ski leg

Install the ball joint remover (P/N 529 035 827) and detach ball joint from ski leg.


529035827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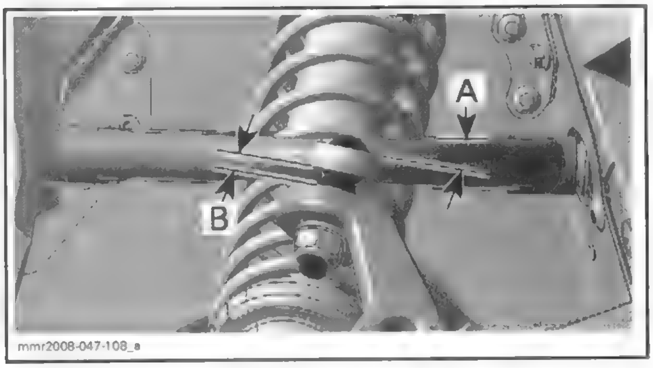
Remove ball joint.

Upper Ball Joint Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

When installing upper ball joint, ensure to tilt it with the proper angle as shown. The ball joint housing must be parallel to ski leg tab. This mounting position corresponds to 10° ± 3° angle from upper arm.



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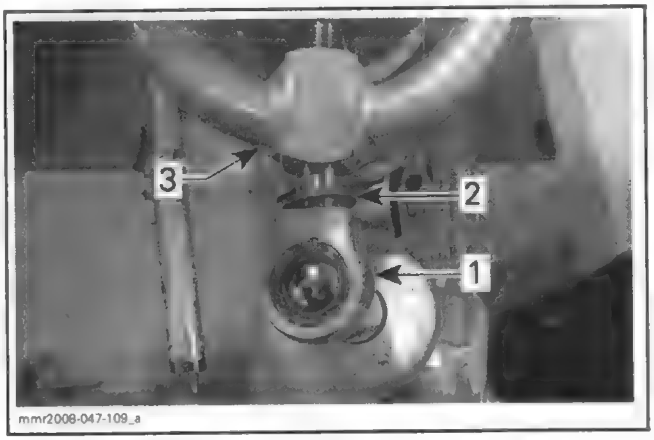
A. 10° ± 3°
B. Parallel

Install ball joint washers as shown.



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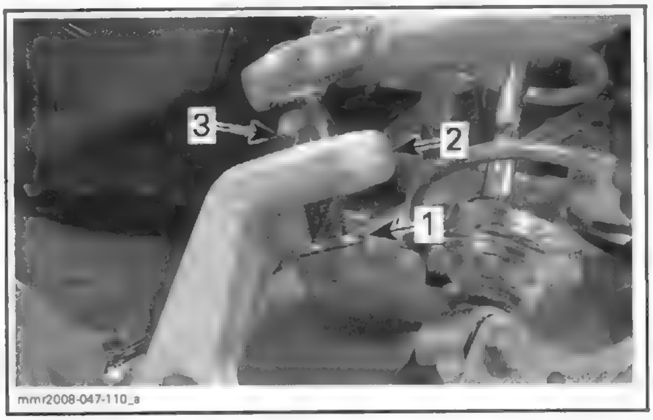
1. *Ball joint housing*
2. *Washer*
3. *Upper suspension arm*



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1. *Washer*
2. *Ski leg*
3. *Ball joint*

Tighten nuts to 48 N•m (35 lbf•ft).

LOWER SUSPENSION ARM

Lower Suspension Arm Inspection

Check suspension arm for distortion or damage. Replace if necessary.

Detach shock absorber and stabilizer bar from lower suspension arm. Move suspension arm from side to side then up and down. There should be no noticeable loose. Replace bushings and/or sleeves if necessary.

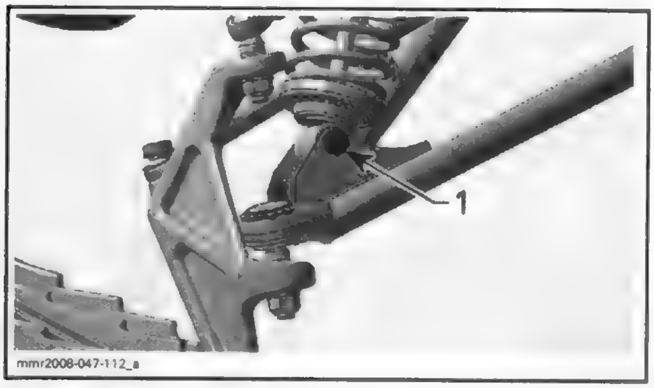
NOTE: A play of 2 mm (.079 in) is acceptable when the suspension arm is moved forward and backward.

Check sleeves inside suspension arm attachments for wear or damage.

Lower Suspension Arm Removal

Lift the front of vehicle until skis are off the ground.

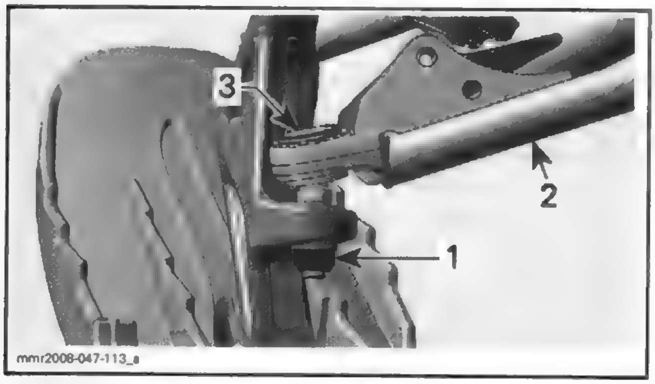
Remove shock absorber lower bolt.



1. Shock absorber lower bolt

Detach stabilizer link from lower suspension arm. Refer to *STABILIZER BAR* further in this section.

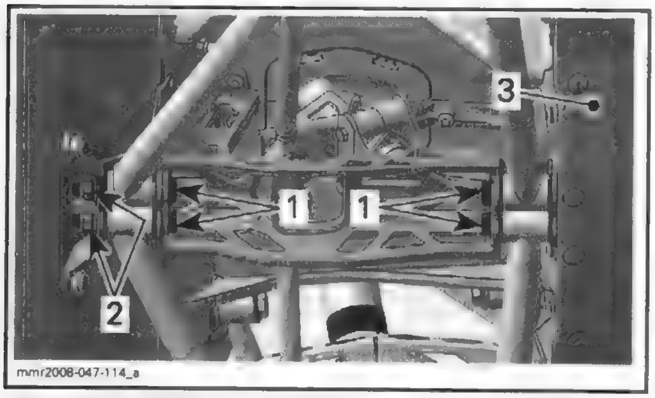
Remove lower ball joint nuts.



1. Ball joint nut
2. Lower suspension arm
3. Lower ball joint

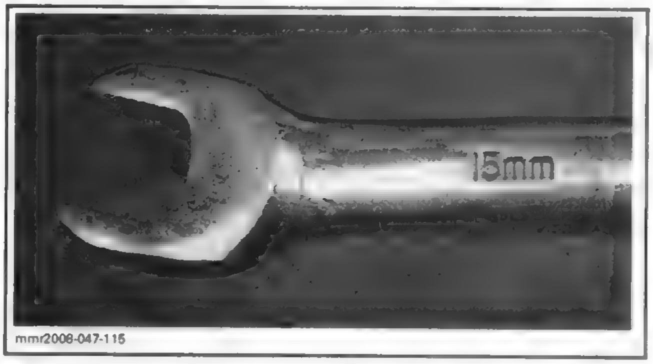
Using a suitable ball joint remover, detach lower ball joint from ski leg.

Remove suspension arm bolts.



UNDERNEATH FRONT OF VEHICLE
1. Suspension arm bolts
2. Rear nuts
3. Bottom pan

NOTE: To hold rear nuts, modify a 15 mm opened wrench as shown.



Remove lower suspension arm from vehicle.

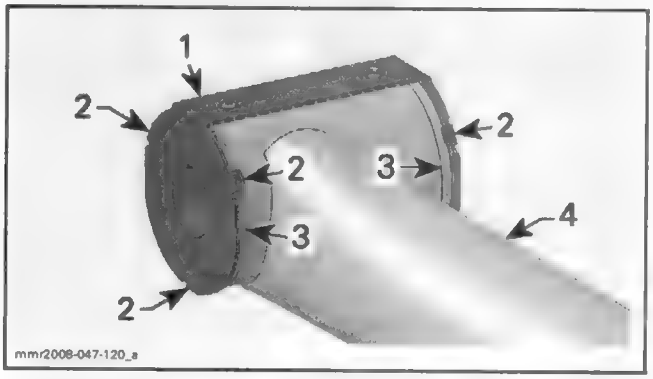
Lower Suspension Arm Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install a wear plate over bushings.

Position the wear plate on top.

Fold all tabs against bushings.



1. Wear plate
2. Wear plate tabs
3. Bushings
4. Lower suspension arm

LOWER BALL JOINT

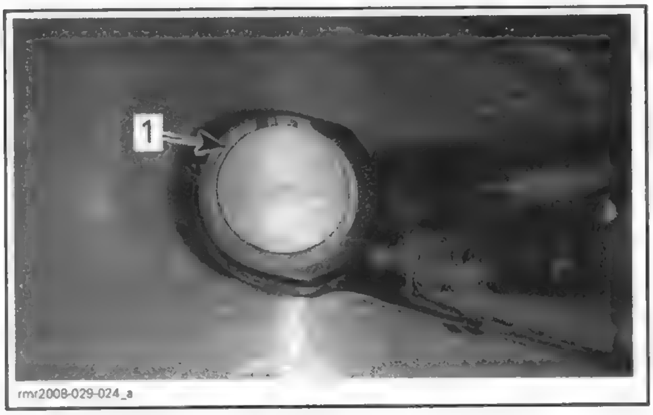
Lower Ball Joint Inspection

Inspect ball joint end for damage. Ensure it's moving freely without play. Replace ball joints as required.

Lower Ball Joint Removal

Remove the *LOWER SUSPENSION ARM*, see procedure in this section.

Remove circlip securing ball joint to suspension arm.



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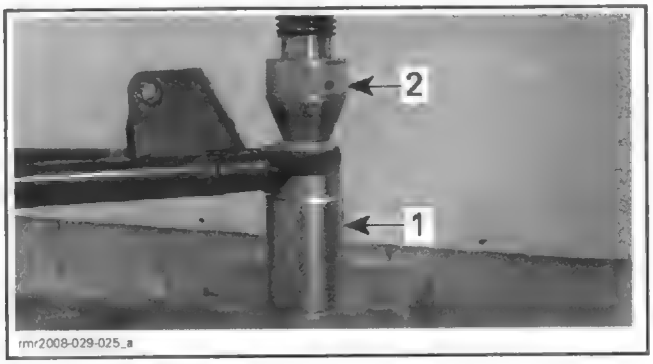
1. *Circlip*

Using a press and the ball joint remover (P/N 529 036 121), press ball joint out of the lower suspension arm.



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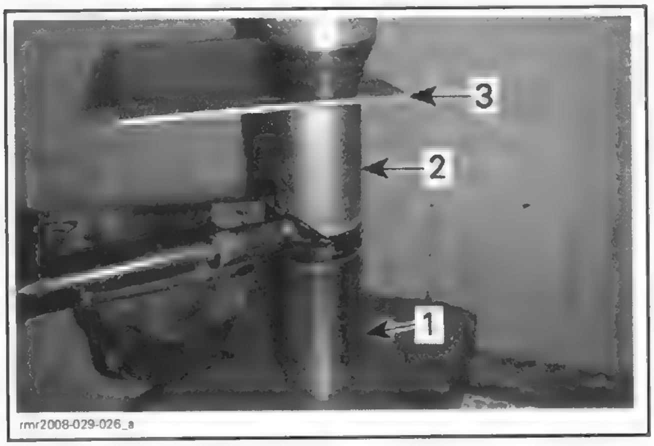
1. *Ball joint remover*
2. *Press*

Lower Ball Joint Installation

Using a press, the ball joint remover (P/N 529 036 121) and the ball joint installer (P/N 529 035 975), press ball joint into the suspension arm end.



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1. *Ball joint remover support*
2. *Ball joint installer*
3. *Steel plate*

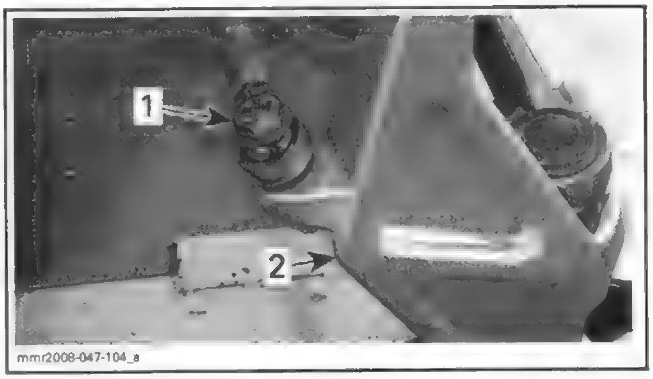
Install the *LOWER SUSPENSION ARM* on vehicle, see procedure in this section.

SKI LEG

Ski Leg Removal

Remove ski from ski leg.

Detach tie-rod end from ski leg.



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1. *Tie-rod end bolt*
2. *Ski leg*

Remove upper and lower ball joints from ski leg. Refer to *UPPER BALL JOINT* and *LOWER BALL JOINT* in this section.

Ski Leg Installation

The installation is the reverse of the removal procedure.

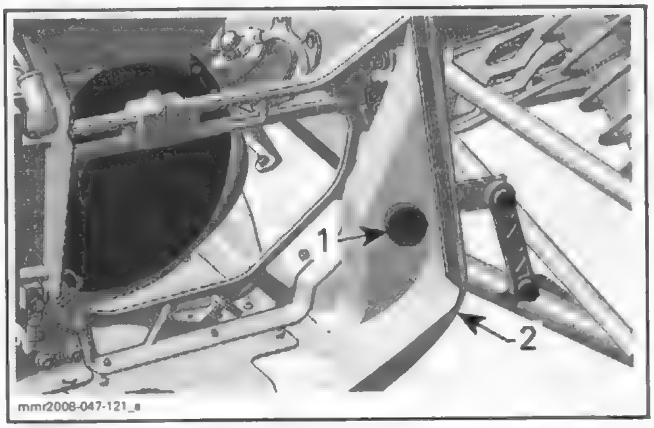
STABILIZER BAR

Stabilizer Bar Removal

Remove the RH side panel. Refer to *BODY* section.

Remove the muffler. Refer to *EXHAUST SYSTEM* section.

Remove the cap at the bottom of the RH side bottom pan.



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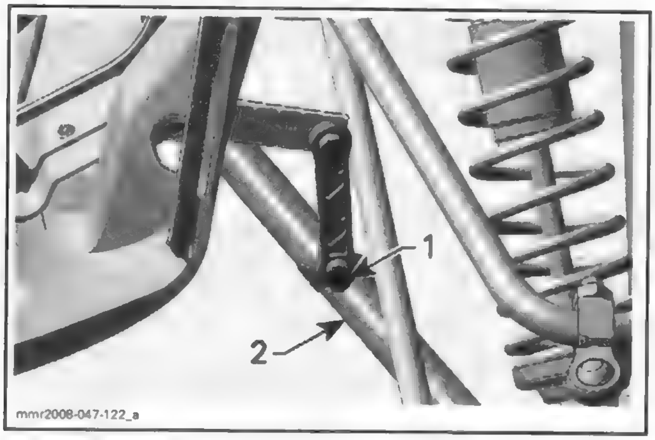
1. *Stabilizer bar cap*
2. *RH side bottom pan*

Remove bolts securing stabilizer links to lower suspension arms.


1
2
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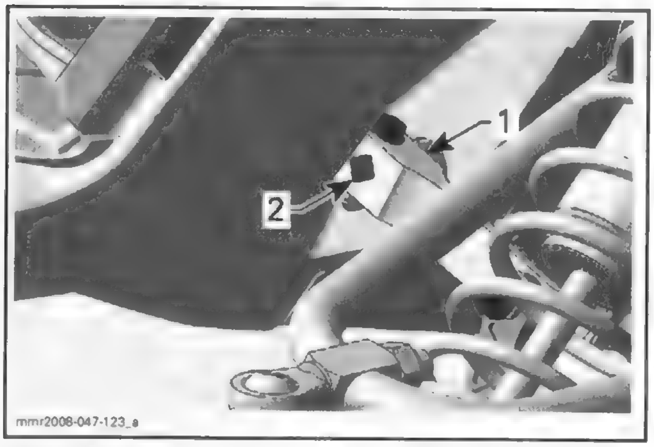
RH SIDE SHOWN
1. *Stabilizer link bolt*
2. *Lower suspension arm*

Unscrew stabilizer lever bolts.

Remove stabilizer levers from stabilizer bar.


1
2
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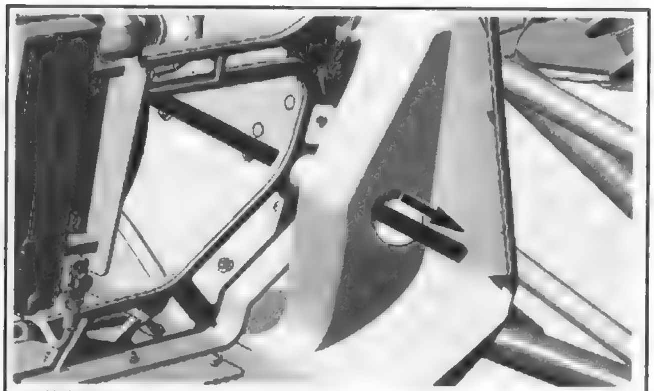
RH SIDE SHOWN
1. *Stabilizer lever*
2. *Stabilizer bar*

Slide stabilizer bar out of vehicle.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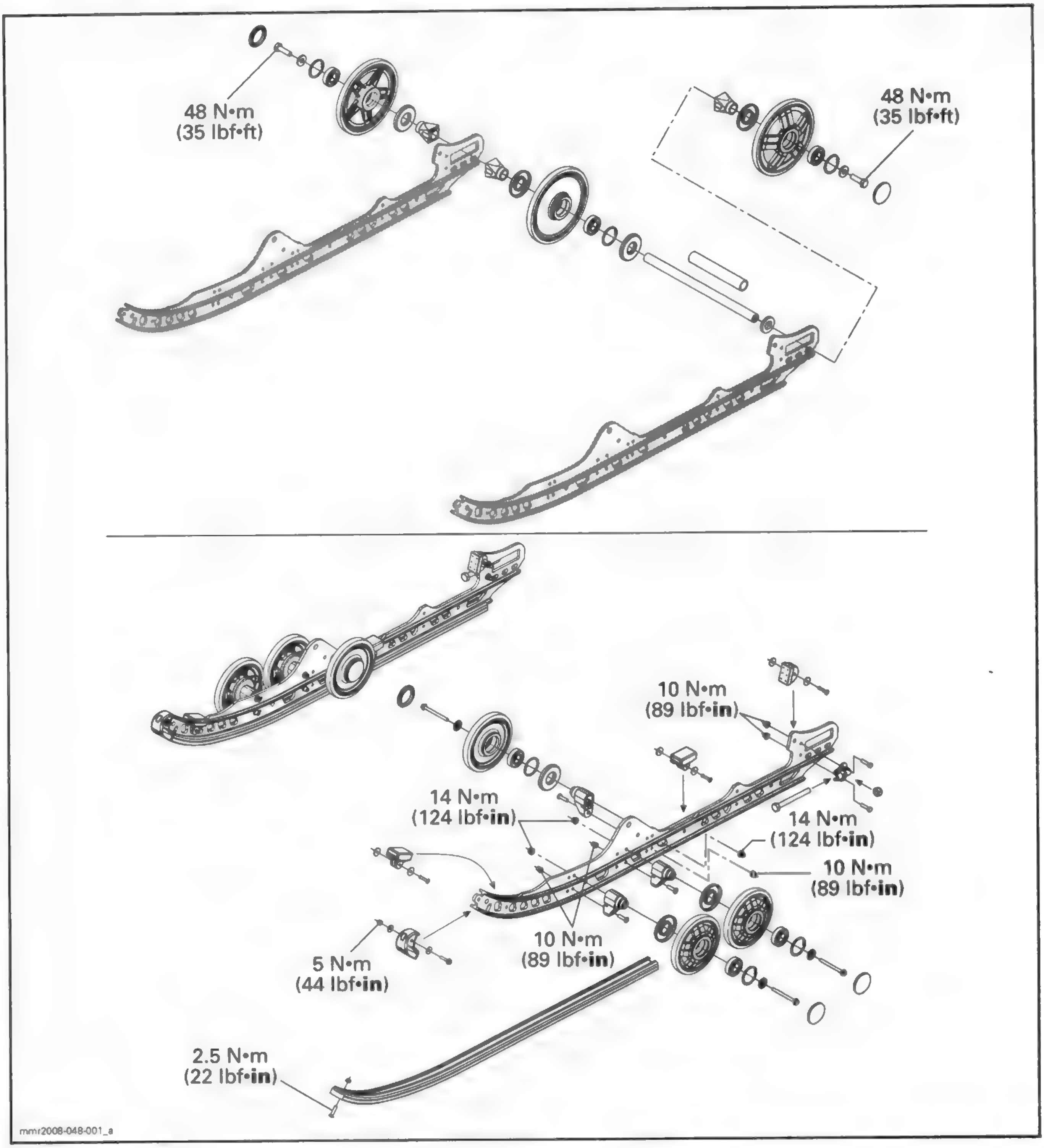
Stabilizer Bar Installation

The installation is the reverse of the removal procedure.

RAILS AND IDLERS WHEELS

GSX Series and MX Z (Adrenaline, Renegade, Renegade X and Trail)


48 N•m
(35 lbf•ft)
48 N•m
(35 lbf•ft)
10 N•m
(89 lbf•in)
14 N•m
(124 lbf•in)
14 N•m
(124 lbf•in)
10 N•m
(89 lbf•in)
10 N•m
(89 lbf•in)
5 N•m
(44 lbf•in)
2.5 N•m
(22 lbf•in)
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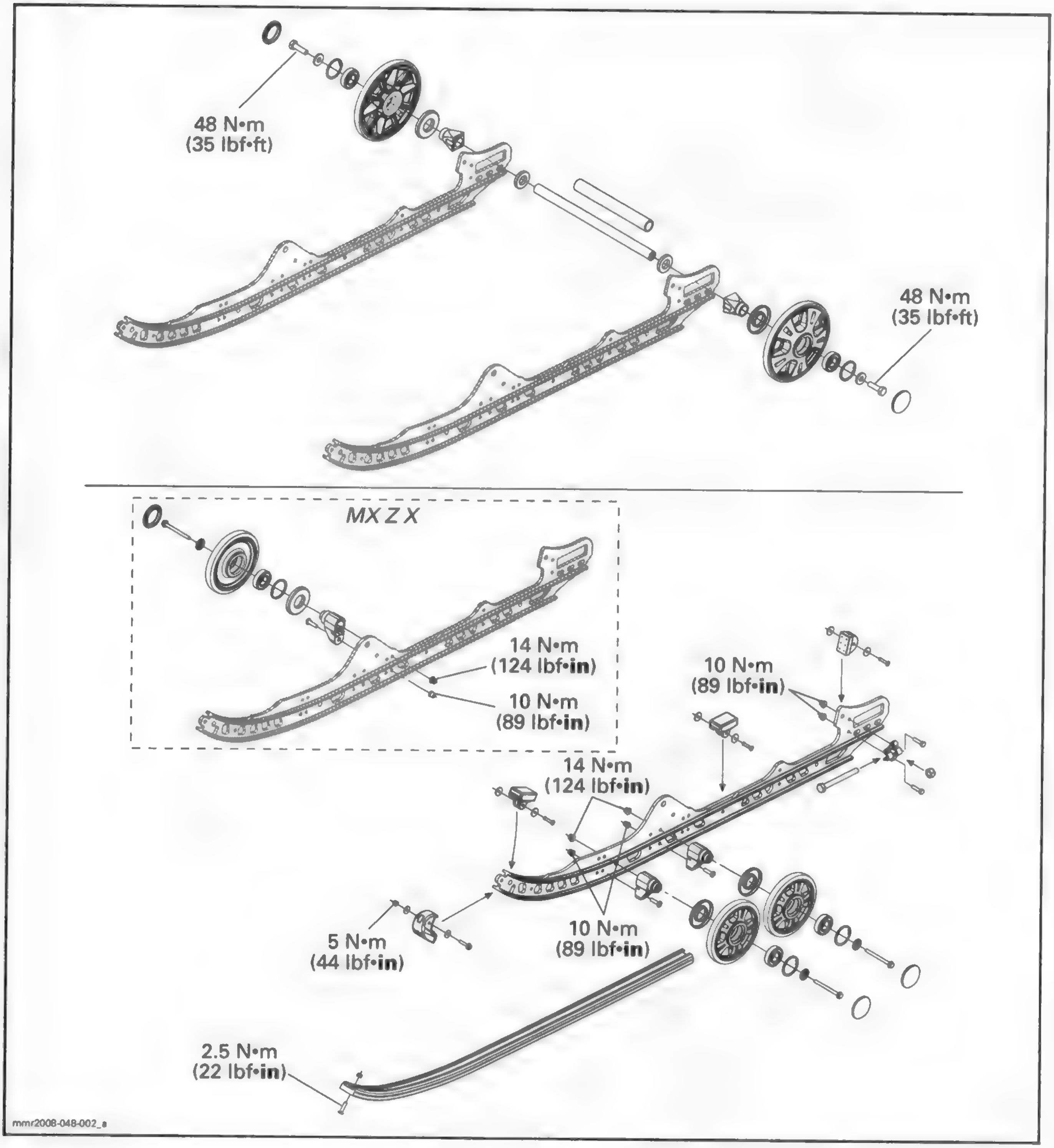
MX Z (TNT and X)


48 N•m
(35 lbf•ft)
48 N•m
(35 lbf•ft)
MX Z X
14 N•m
(124 lbf•**in**)
10 N•m
(89 lbf•**in**)
10 N•m
(89 lbf•**in**)
14 N•m
(124 lbf•**in**)
5 N•m
(44 lbf•**in**)
10 N•m
(89 lbf•**in**)
2.5 N•m
(22 lbf•**in**)
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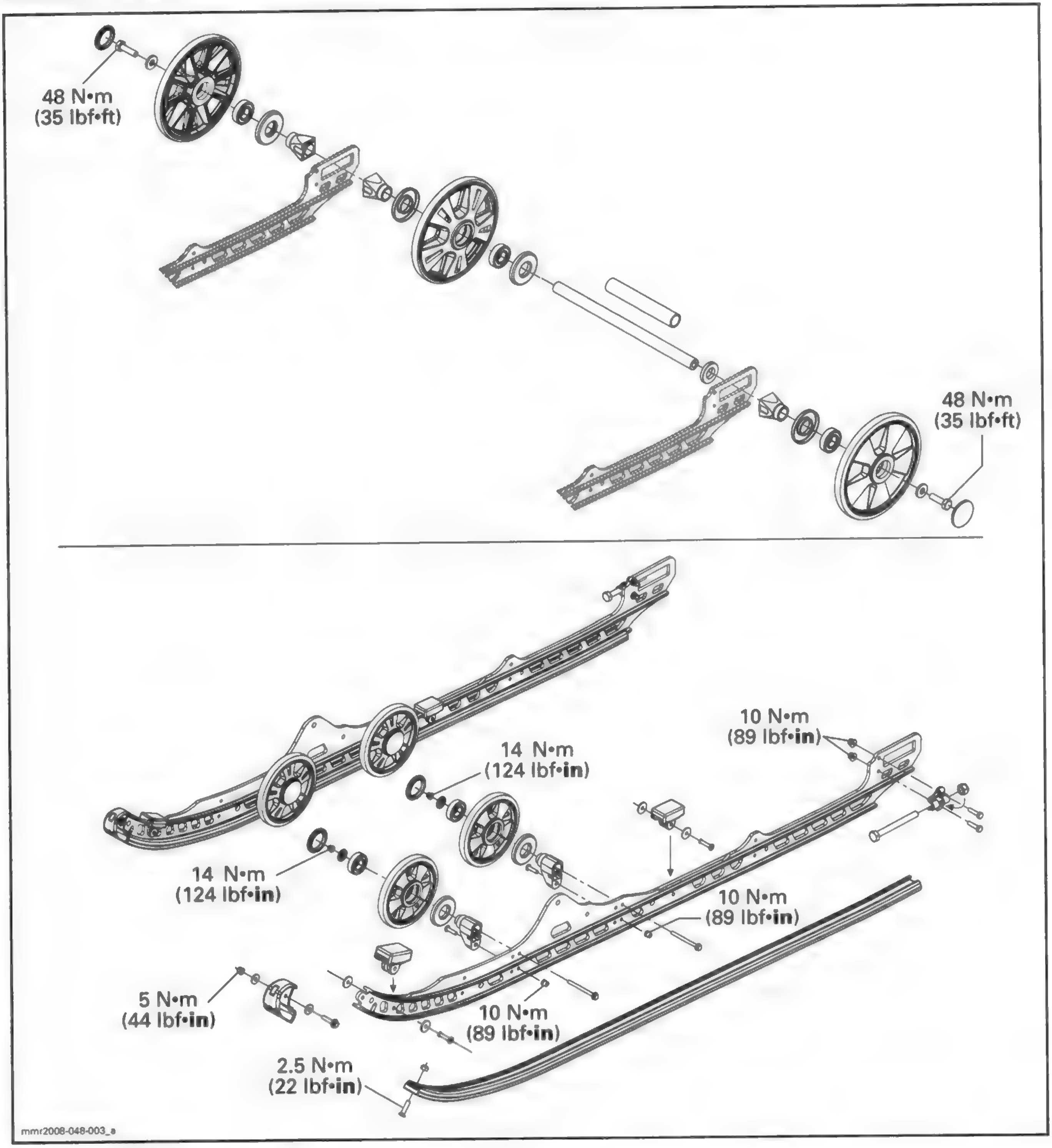
SUMMIT Series


48 N•m
(35 lbf•ft)
48 N•m
(35 lbf•ft)
10 N•m
(89 lbf•**in**)
14 N•m
(124 lbf•**in**)
14 N•m
(124 lbf•**in**)
10 N•m
(89 lbf•**in**)
5 N•m
(44 lbf•**in**)
10 N•m
(89 lbf•**in**)
2.5 N•m
(22 lbf•**in**)
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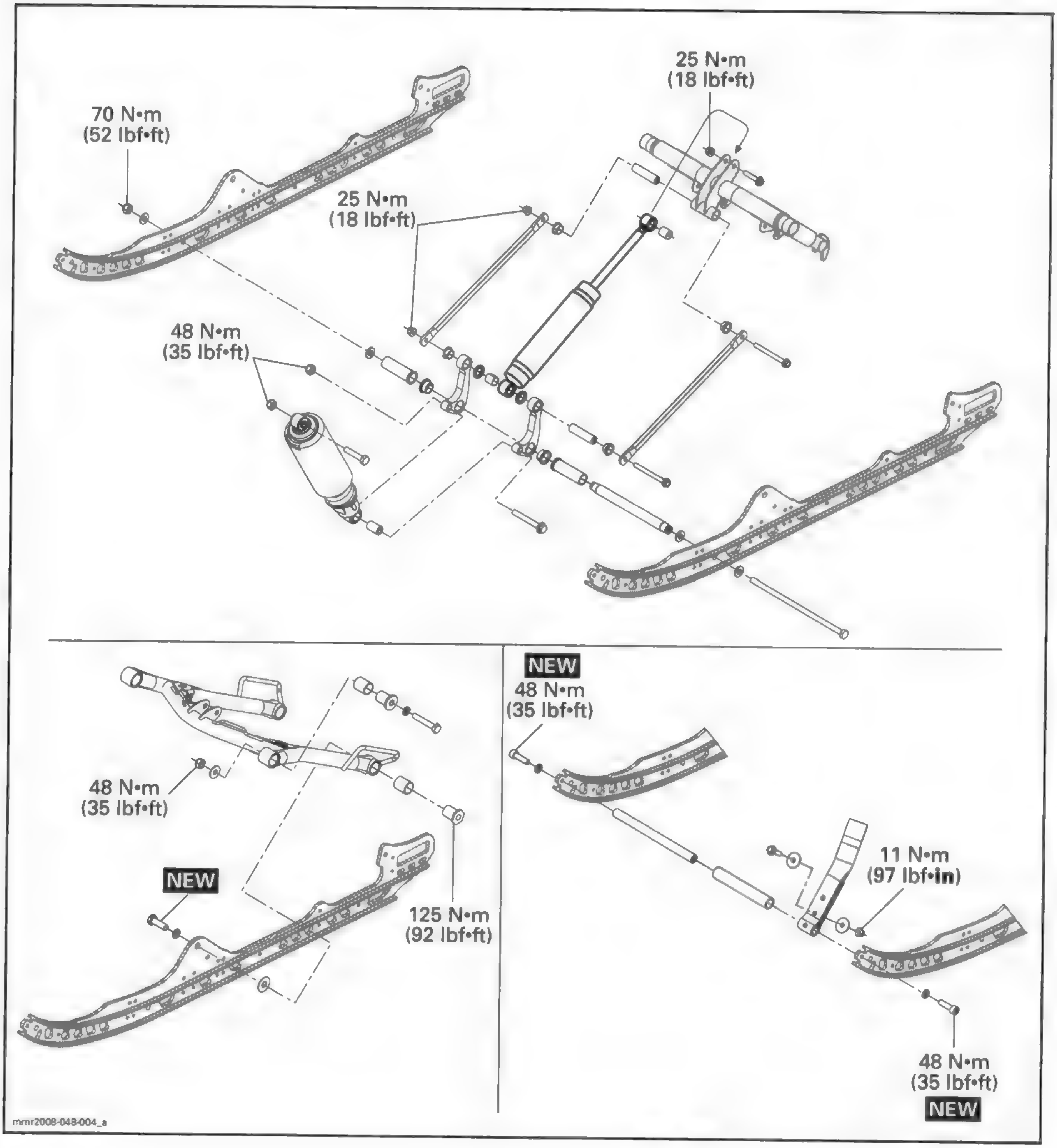
FRONT ARM

GSX Series and MX Z (Adrenaline, TNT, Trail and X)


25 N•m
(18 lbf•ft)
70 N•m
(52 lbf•ft)
25 N•m
(18 lbf•ft)
48 N•m
(35 lbf•ft)
NEW
48 N•m
(35 lbf•ft)
48 N•m
(35 lbf•ft)
NEW
125 N•m
(92 lbf•ft)
11 N•m
(97 lbf•in)
48 N•m
(35 lbf•ft)
NEW
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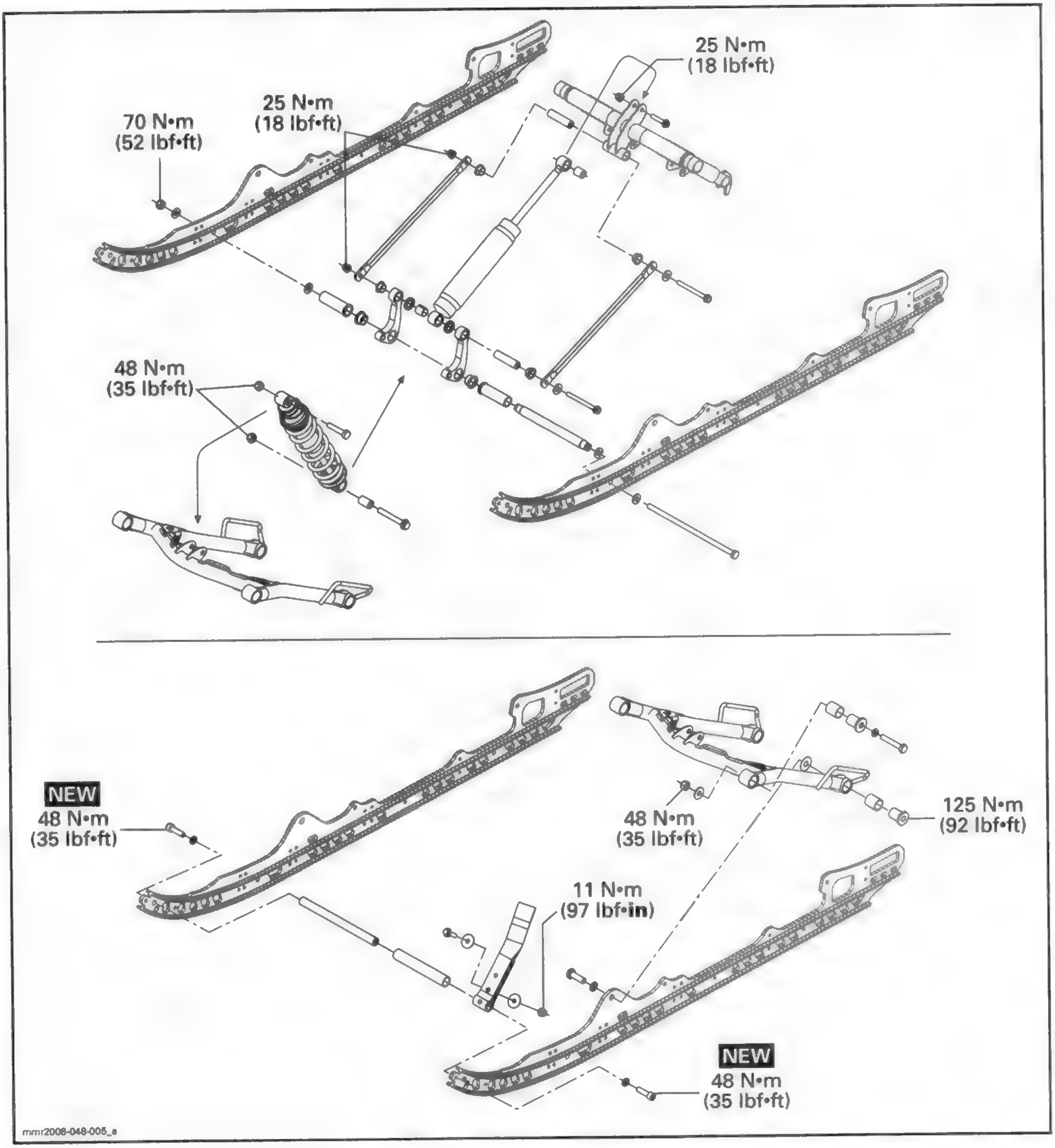
MX Z (Renegade and Renegade X)


25 N•m
(18 lbf•ft)
70 N•m
(52 lbf•ft)
25 N•m
(18 lbf•ft)
48 N•m
(35 lbf•ft)
NEW
48 N•m
(35 lbf•ft)
48 N•m
(35 lbf•ft)
125 N•m
(92 lbf•ft)
11 N•m
(97 lbf•in)
NEW
48 N•m
(35 lbf•ft)

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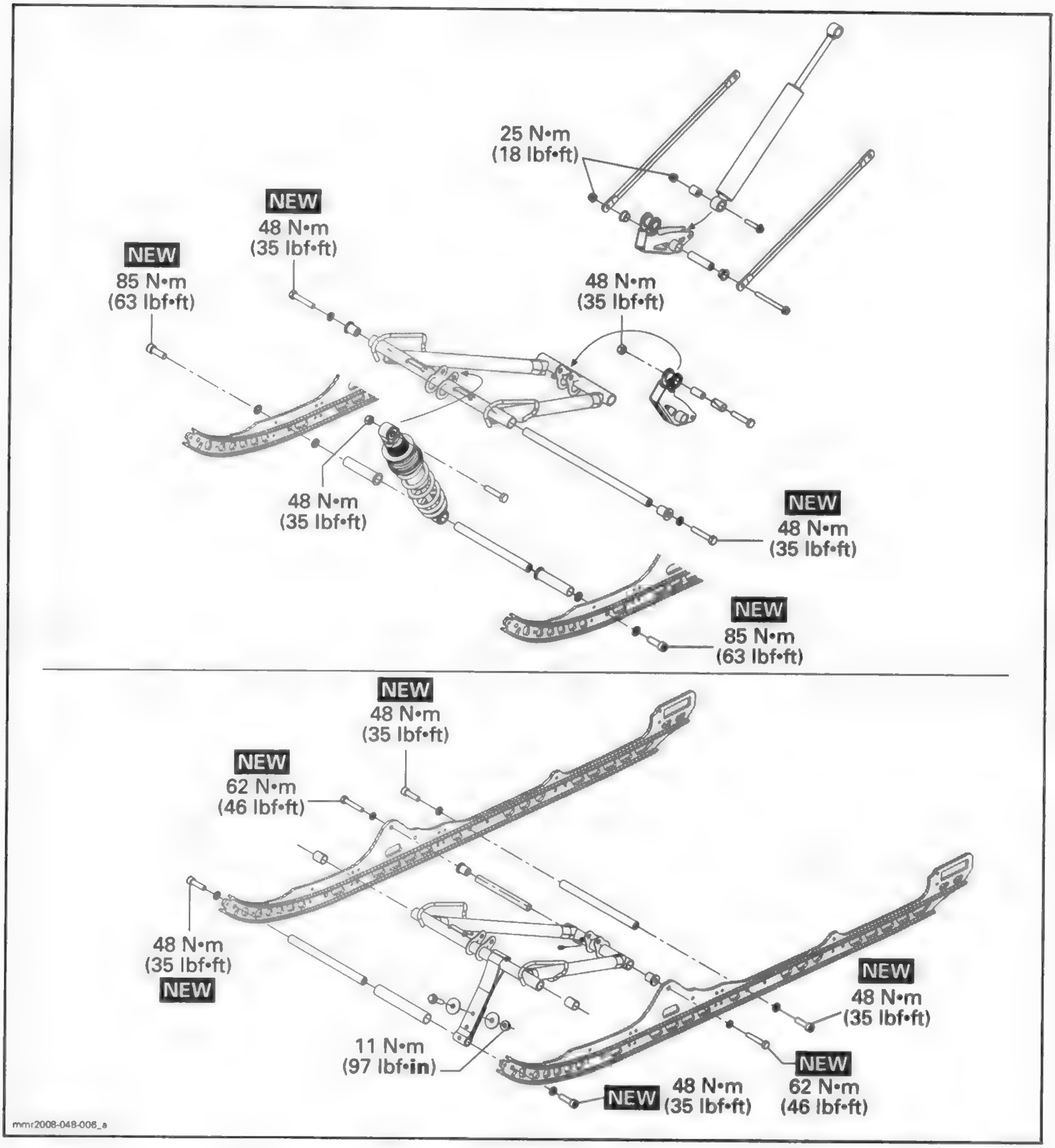
SUMMIT Series


25 N•m
(18 lbf•ft)
NEW
48 N•m
(35 lbf•ft)
NEW
85 N•m
(63 lbf•ft)
48 N•m
(35 lbf•ft)
48 N•m
(35 lbf•ft)
NEW
48 N•m
(35 lbf•ft)
NEW
85 N•m
(63 lbf•ft)
NEW
48 N•m
(35 lbf•ft)
NEW
62 N•m
(46 lbf•ft)
48 N•m
(35 lbf•ft)
NEW
NEW
48 N•m
(35 lbf•ft)
11 N•m
(97 lbf•in)
NEW
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(46 lbf•ft)
NEW
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(35 lbf•ft)
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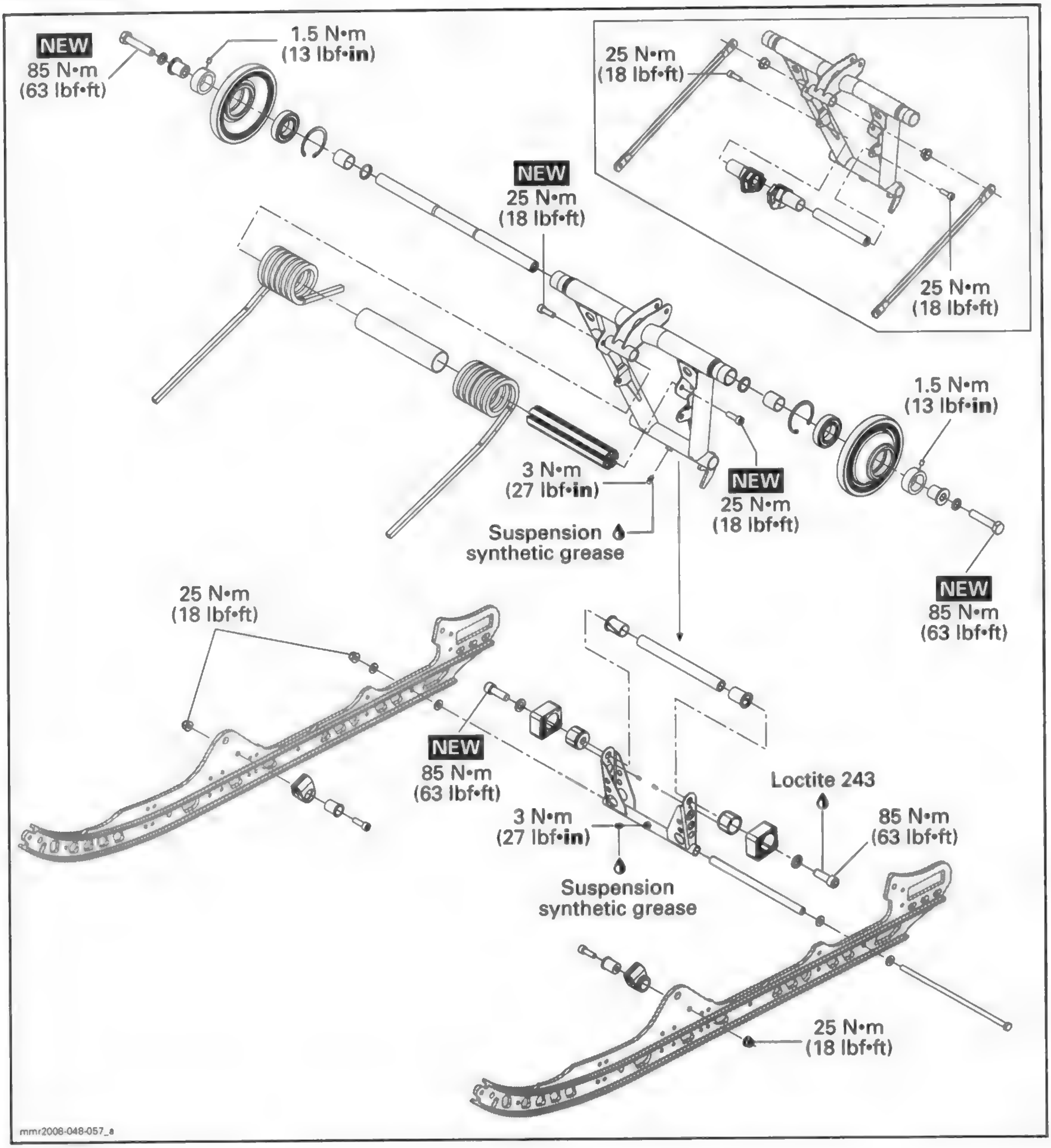
REAR ARM

GSX Series


NEW
85 N•m
(63 lbf•ft)
1.5 N•m
(13 lbf•in)
25 N•m
(18 lbf•ft)
25 N•m
(18 lbf•ft)
NEW
25 N•m
(18 lbf•ft)
1.5 N•m
(13 lbf•in)
3 N•m
(27 lbf•in)
Suspension synthetic grease
NEW
25 N•m
(18 lbf•ft)
NEW
85 N•m
(63 lbf•ft)
25 N•m
(18 lbf•ft)
NEW
85 N•m
(63 lbf•ft)
Loctite 243
85 N•m
(63 lbf•ft)
3 N•m
(27 lbf•in)
Suspension synthetic grease
25 N•m
(18 lbf•ft)
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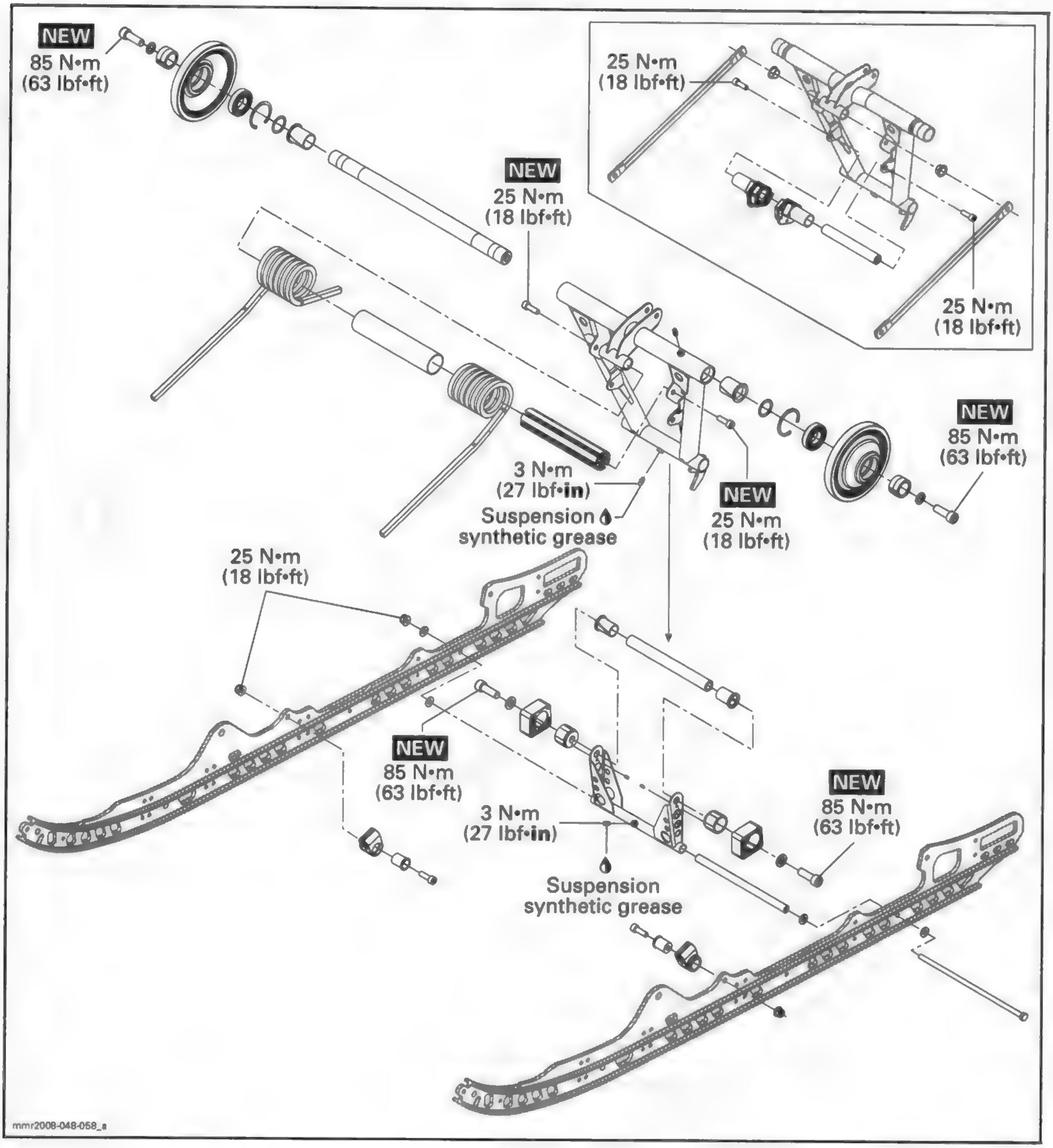
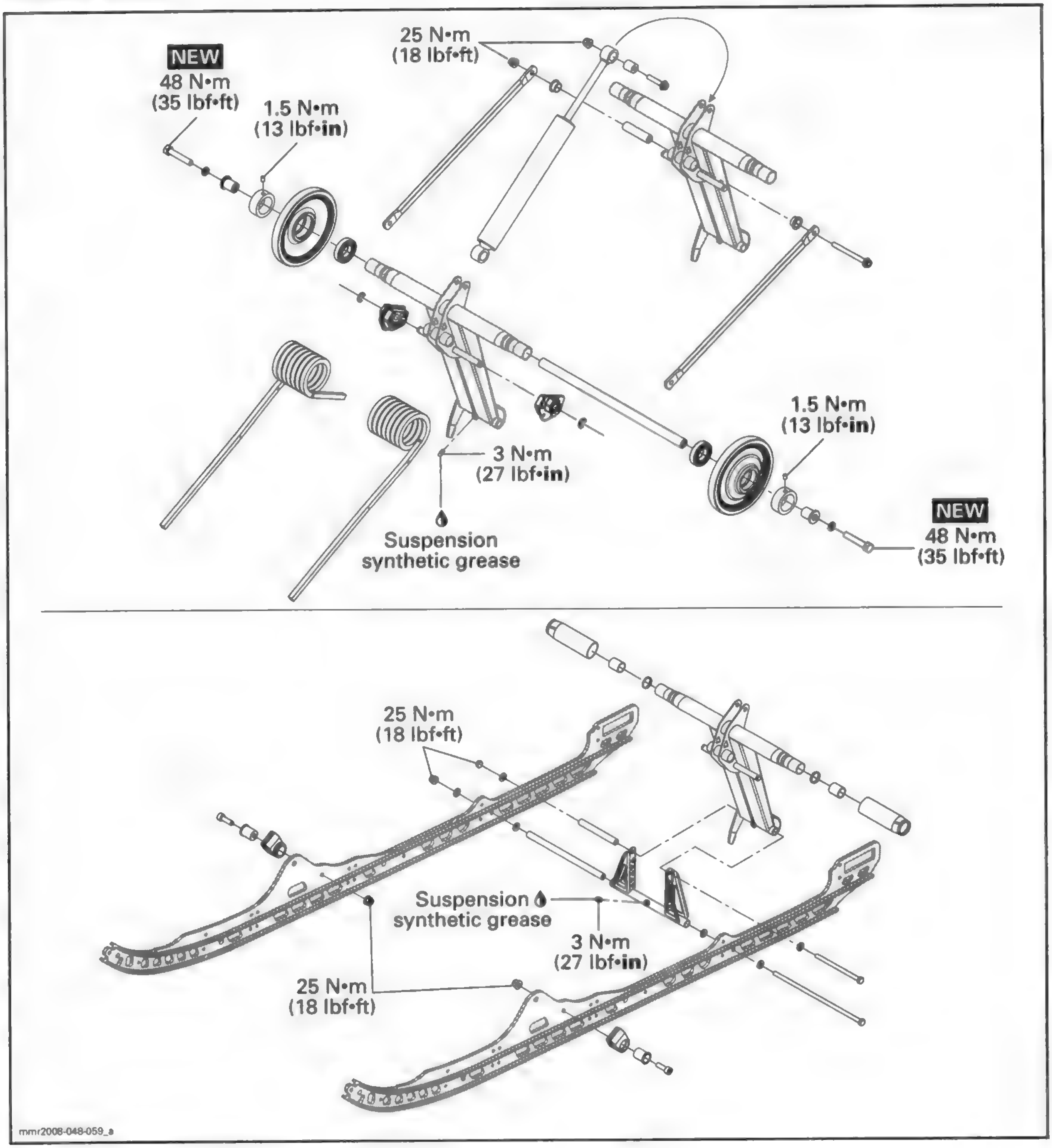
MX Z Series

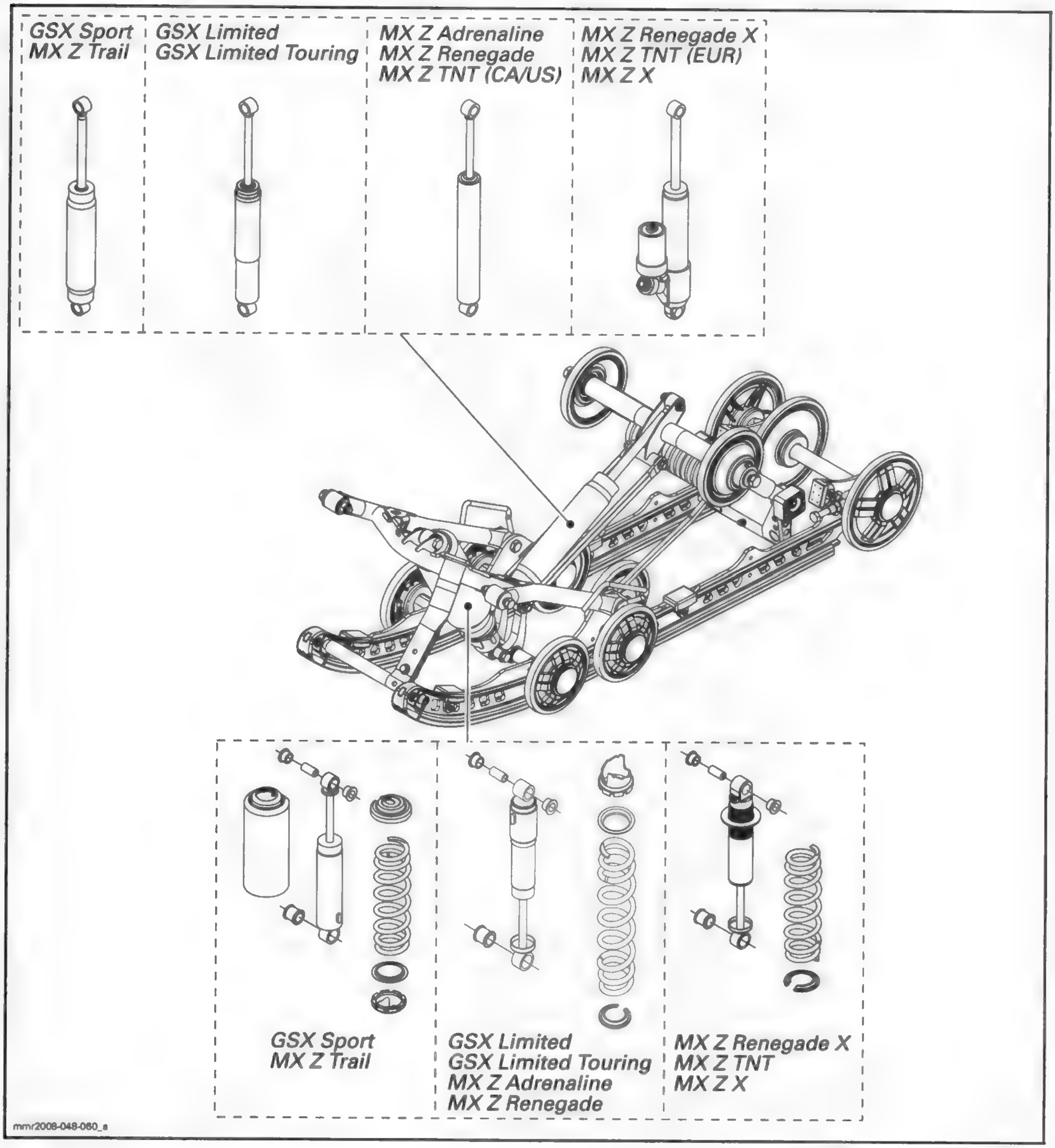

NEW
85 N•m
(63 lbf•ft)
25 N•m
(18 lbf•ft)
NEW
25 N•m
(18 lbf•ft)
25 N•m
(18 lbf•ft)
NEW
85 N•m
(63 lbf•ft)
3 N•m
(27 lbf•in)
Suspension synthetic grease
NEW
25 N•m
(18 lbf•ft)
25 N•m
(18 lbf•ft)
NEW
85 N•m
(63 lbf•ft)
3 N•m
(27 lbf•in)
Suspension synthetic grease
NEW
85 N•m
(63 lbf•ft)
mmr2008-048-058_a

SUMMIT Series

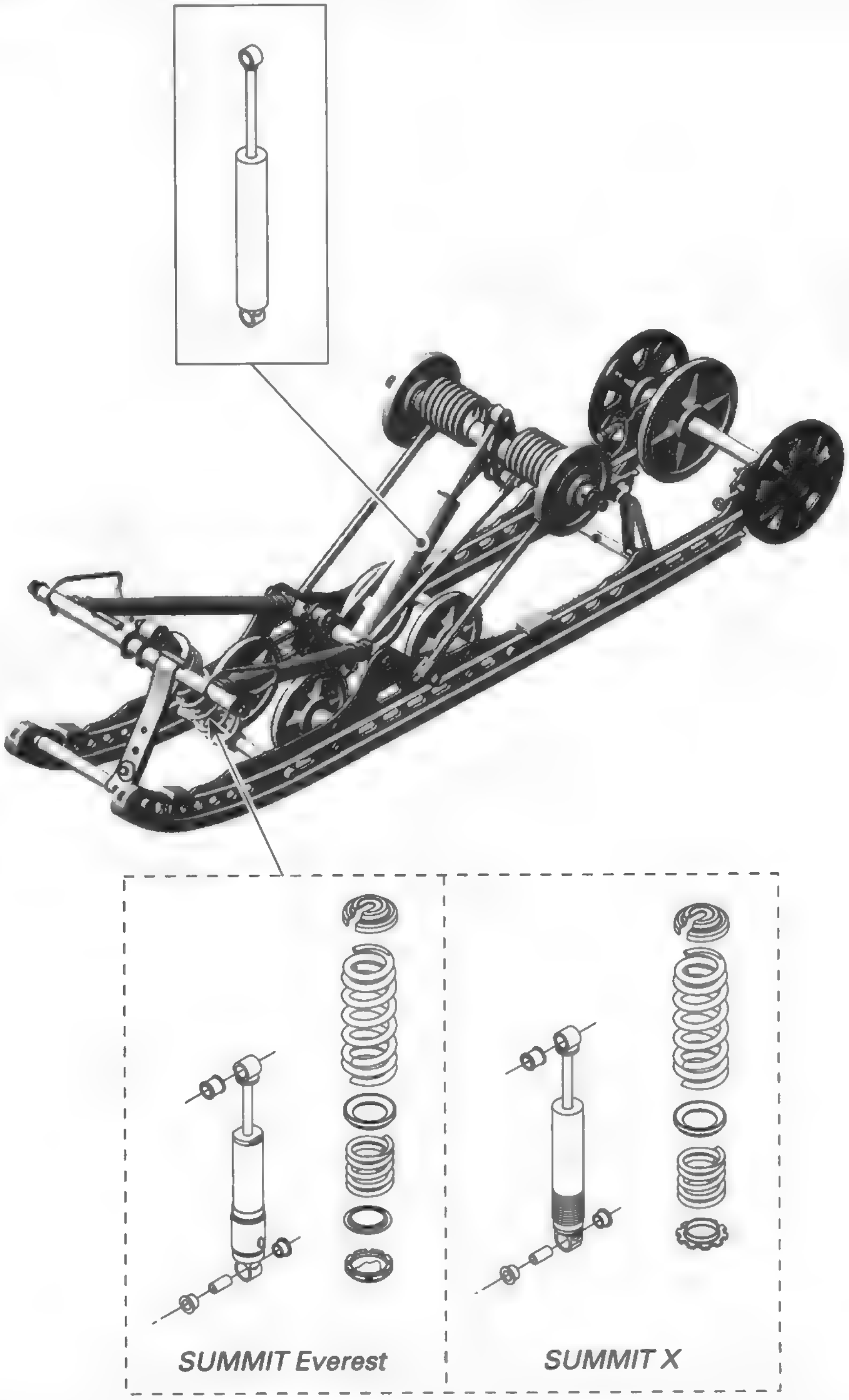

25 N•m
(18 lbf•ft)
NEW
48 N•m
(35 lbf•ft)
1.5 N•m
(13 lbf•in)
1.5 N•m
(13 lbf•in)
3 N•m
(27 lbf•in)
Suspension
synthetic grease
NEW
48 N•m
(35 lbf•ft)
25 N•m
(18 lbf•ft)
Suspension
synthetic grease
3 N•m
(27 lbf•in)
25 N•m
(18 lbf•ft)
mmr2008-048-059_a

SHOCK ABSORBERS

GSX Series and MX Z Series


GSX Sport
MX Z Trail
GSX Limited
GSX Limited Touring
MX Z Adrenaline
MX Z Renegade
MX Z TNT (CA/US)
MX Z Renegade X
MX Z TNT (EUR)
MX Z X
GSX Sport
MX Z Trail
GSX Limited
GSX Limited Touring
MX Z Adrenaline
MX Z Renegade
MX Z Renegade X
MX Z TNT
MX Z X
mmr2008-048-060_a

SUMMIT Series


SUMMIT Everest
SUMMIT X
mmr2008-048-061_a

GENERAL

NOTE: Refer to *TECHNICAL SPECIFICATIONS* to identify the snowmobile suspension type.

During assembly/installation, use torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

> **⚠ WARNING**
>
> **Torque wrench tightening specifications must be strictly adhered to.**
> **Locking devices (e.g.: locking tabs, cotter pins, etc.) must replaced with new ones.**

Suspension Adjustment

To adjust the rear suspension, refer to the appropriate *OPERATOR'S GUIDE*.

PROCEDURES

NOTE: Many parts can be changed with rear suspension in place. When specified, refer to *SUSPENSION ASSEMBLY* to remove rear suspension from vehicle.

SUSPENSION ASSEMBLY

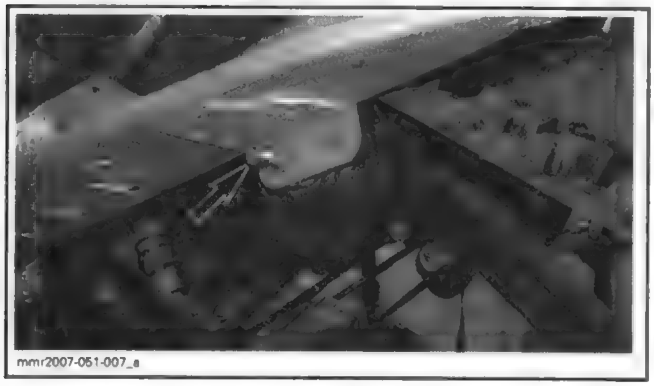
Suspension Assembly Removal

Lift rear of vehicle and support it off the ground.

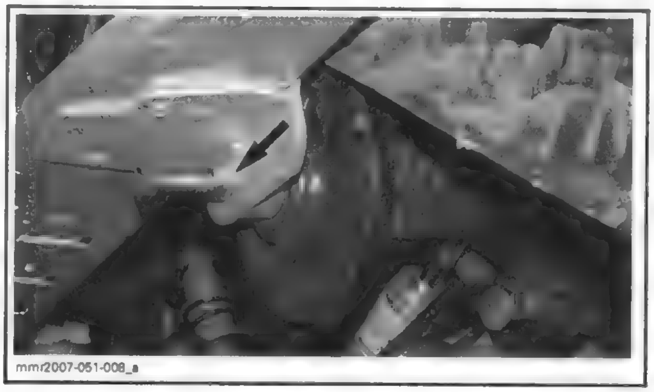
Completely loosen track tension.

Remove and discard rear arm bolts from chassis. Use the following procedure to remove bolts easily.

- Unscrew one of the socket screws securing the rear arm to frame.



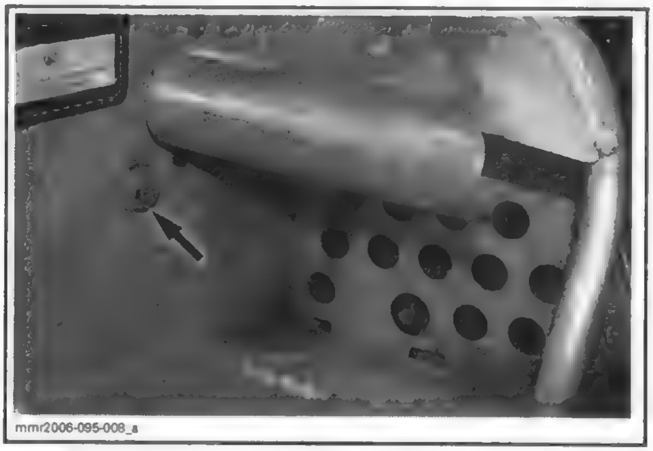
- Replace this socket screw with an hexagonal bolt (longer than socket screw) and a nut.
- Screw the hexagonal bolt completely and lock it with the nut.



- Unscrew the socket screw on the other side then unlock nut and remove the hexagonal bolt.

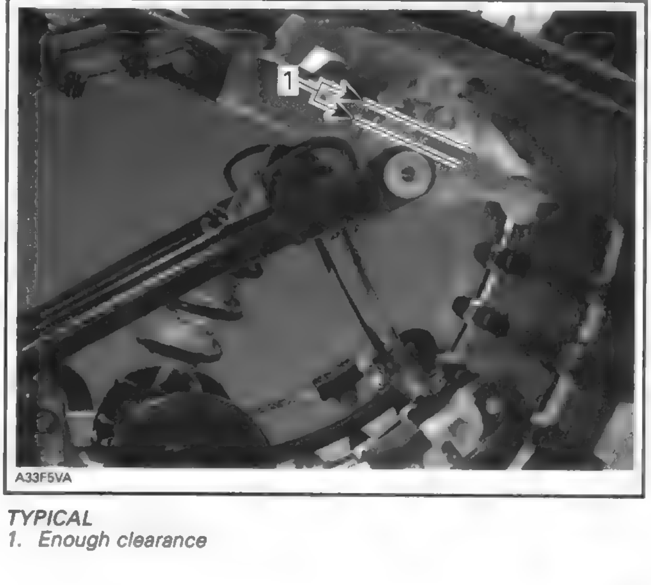
Remove bolts retaining front arm to tunnel.

NOTE: On **SUMMIT models**, discard the front arm bolts.

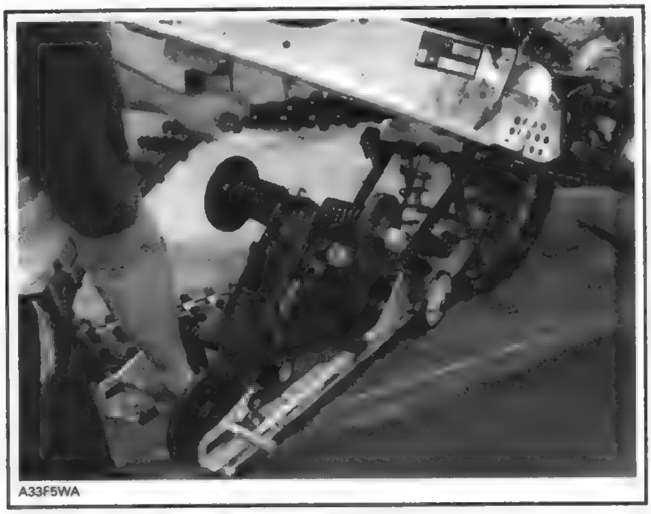


TYPICAL

Lift rear of vehicle until front arm as enough clearance to pass underneath tunnel.



TYPICAL
1. Enough clearance



TYPICAL — REMOVE SUSPENSION

Suspension Assembly Installation

Installation is the reverse of removal procedure. Pay attention to the following details.

Inspect track thoroughly before reinstalling suspension. Refer to *TRACK*.

Install suspension into track with front portion first.

Install front arm bolts. On **SUMMIT models**, install NEW bolts.

Torque them to 48 N•m (35 lbf•ft).

Install **NEW** rear arm bolts and tighten them.

REAR ARM BOLTS TIGHTENING	
GSX Series and MX Z Series	85 N•m (63 lbf•ft)
SUMMIT Series	48 N•m (35 lbf•ft)

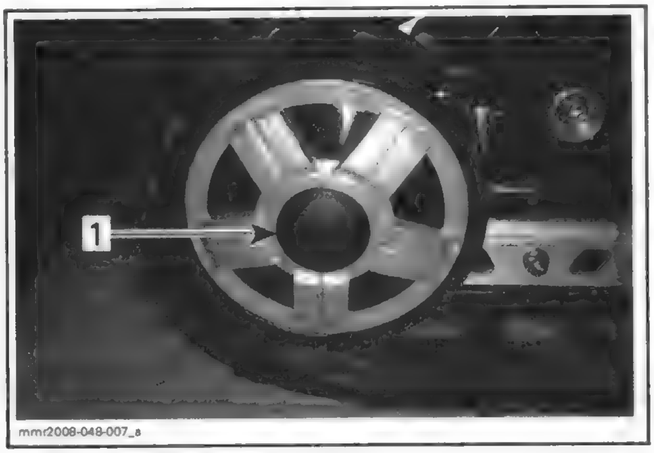
Adjust track tension.

REAR AXLE

Rear Axle Removal

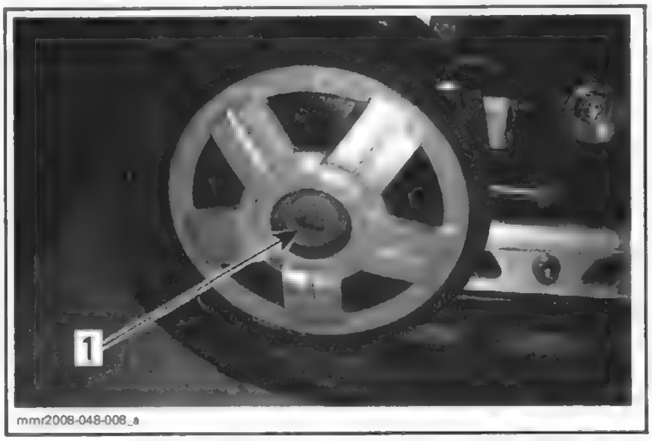
Lift rear of vehicle and support it off the ground.

Remove rear idler wheel caps.



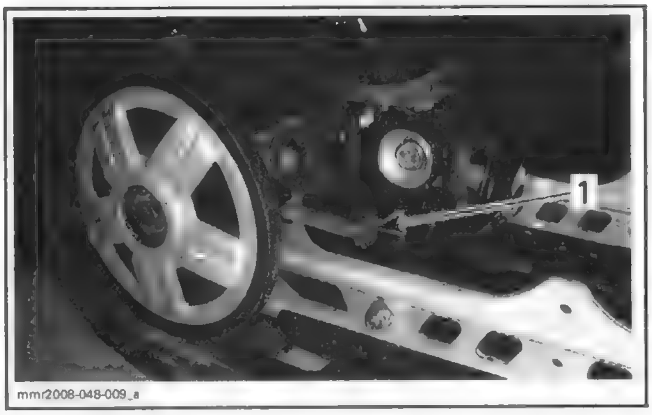
1. *RH rear idler wheel cap*

Unscrew and remove rear axle screws (one each side).



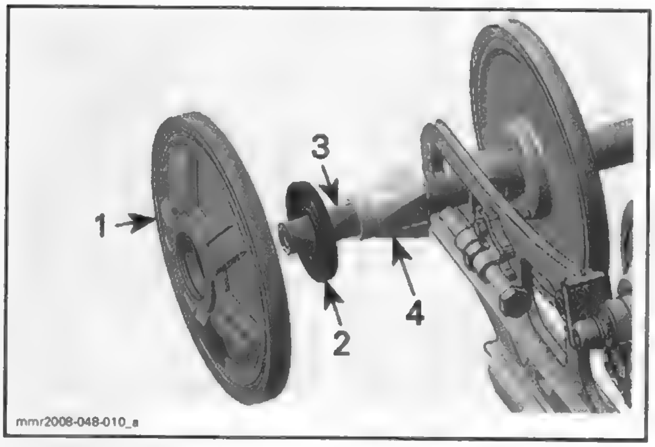
1. *RH rear axle screw*

Completely loosen track tension by unscrewing both adjustment screws.



1. *RH adjustment screw*

Remove rear idler wheels, seals and wheel spacers.


3
1
4
2
mmr2008-048-010_a

RH SIDE SHOWN
1. *Rear idler wheel*
2. *Seal*
3. *Rear axle*
4. *Wheel spacer*

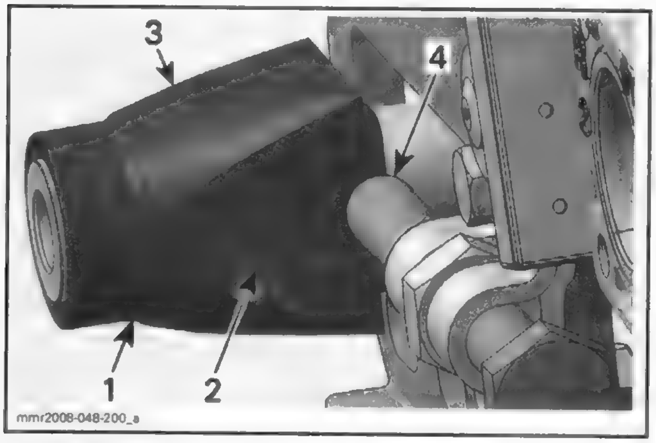
Pull out the rear axle.

Rear Axle Installation

Installation is reverse of removal procedure. However, pay attention to the following.

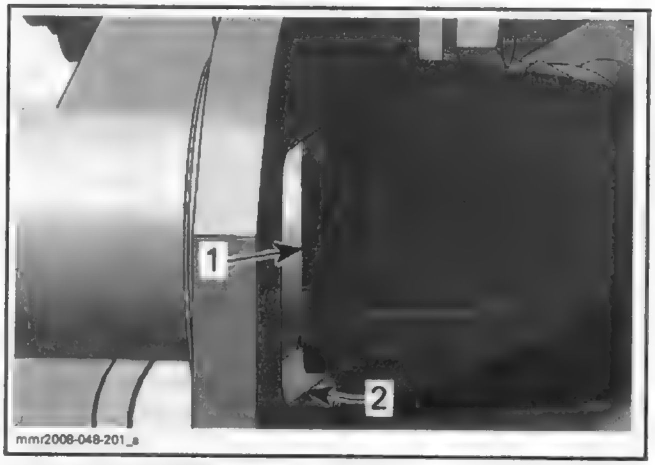
Position all parts correctly.

Position wheel spacers with a flat side up and a groove in front of tensioner screw.


3
4
1
2
mmr2008-048-200_a

1. *Wheel spacer*
2. *Groove*
3. *Flat side*
4. *Tensioner screw*

NOTE: When tightening rear axle, make sure each wheel spacer protuberance is engaged into runner slot.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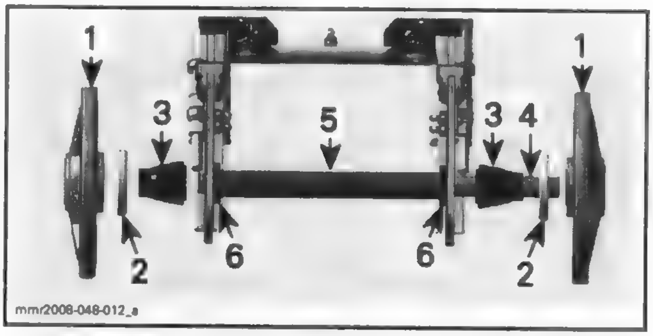
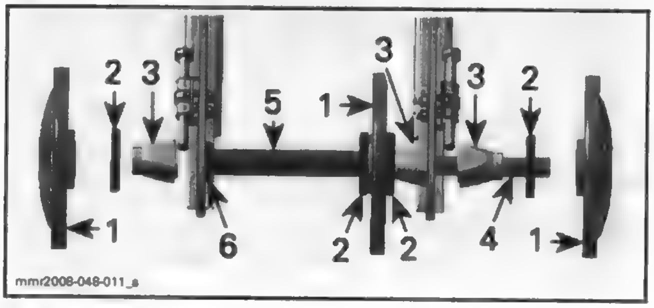
1. *Wheel spacer protuberance*
2. *Runner slot*

MX Z (TNT and X)


1
1
3
5
3
4
2
6
6
2
mmr2008-048-012_a

1. *Idler wheels*
2. *Seals*
3. *Wheel spacers*
4. *Rear axle*
5. *Rear axle spacer*
6. *Washers*

All Other Models


3
2
3
5
1
3
2
1
6
2
2
4
1
mmr2008-048-011_a

1. *Idler wheels*
2. *Seals*
3. *Wheel spacers*
4. *Rear axle*
5. *Rear axle spacer*
6. *Washer*

Adjust track tension. Refer to *TRACK* section.

REAR SHOCK ABSORBER

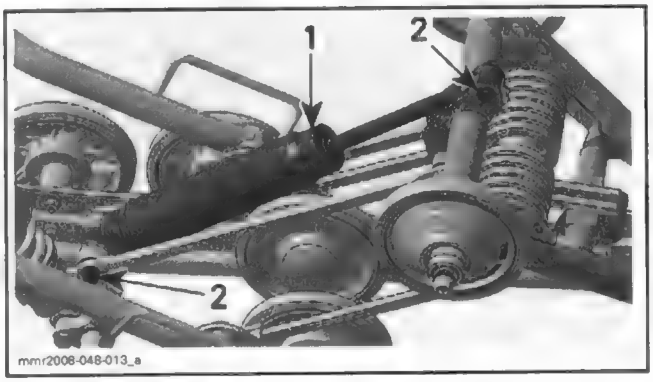
Rear Shock Absorber Removal

Lift rear of vehicle and support it off the ground.

NOTE: If necessary, to ease shock removal, unfasten stopper strap to release shock pressure.

GSX Series and MX Z Series

Remove bolts and nuts from shock.

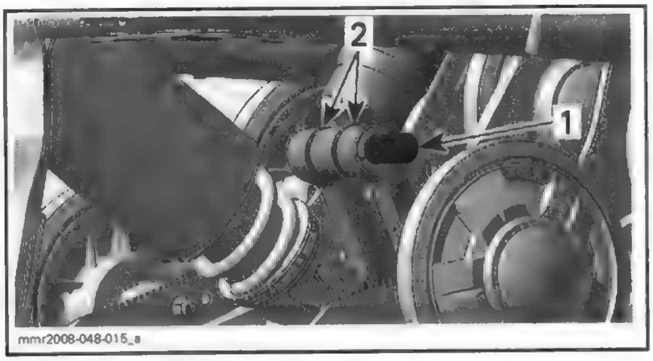


1. *Rear shock absorber*
2. *Remove bolts and nuts*

Lower the bottom end of throttle rods to reach the bar axle.

Remove bar axle retaining the bottom of shock absorber.

Pay attention to plastic spacers.

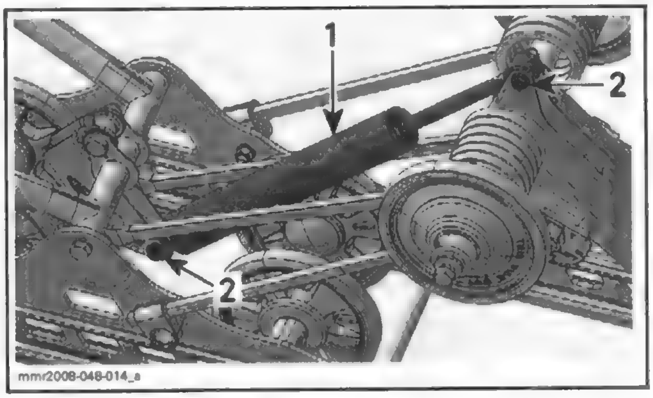


1. *Bar axle*
2. *Plastic spacers*

Remove rear shock absorber.

SUMMIT Series

Remove bolts and nuts from shock.



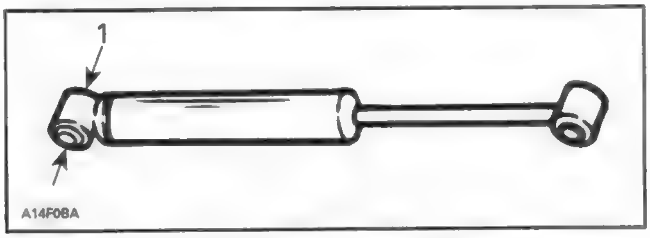
1. *Rear shock absorber*
2. *Remove bolts and nuts*

Rear Shock Absorber Inspection

Hydraulic Shock

Secure the shock body end in a vise with its rod upward.

CAUTION: Do not clamp directly on shock body.



1. *Clamp*

Examine shock for leaks. Extend and compress the piston at least 5 complete strokes with its rod upward.

After, check that shock moves smoothly and with uniform resistance over its entire stroke.

NOTE: For the first 5 complete strokes, it could be normal to note uneven resistance.

Check the following conditions that will denote a defective shock:

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme end of either stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension strokes.

If suspecting a shock is freezing, place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than one in normal condition.

Renew if any faults are present.

Gas Shock except Variable Rate

Because of gas pressure, strong resistance is felt when compressing shock.

To inspect shock operation, or if suspecting an internal leak between oil chamber and gas chamber, check shock as follows:

Install shock in a vise clamping on its bottom eyelet with its rod upward. Verify the compression stroke when the rod is fully extended.

Completely push down the shock rod then release.

The shock should extend unassisted. Rod must come out at a steady speed. If speed suddenly increases particularly at end of extension, replace shock.

If suspecting a shock is freezing, place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than one in normal condition.

Renew if any faults are present.

Variable Rate Gas Shock

Because of gas pressure, strong resistance is felt when compressing shock.

To inspect shock operation, or if suspecting an internal leak between oil chamber and gas chamber, check shock as follows:

Install shock in a vise clamping on its bottom eyelet with its rod upward. Verify the compression stroke when the rod is fully extended.

Push down the shock rod. The feeling should be stiff for around the first 25 mm (1 in), then softer from 25 up to 50 mm (1 to 2 in) and stiffer again after that. This stiff/soft/stiff phenomenon shows the normal operation of shock.

When released, the shock should extend unassisted. The rod speed coming out will go slow - faster and slow again due to the VR zone.

If suspecting a shock is freezing, place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than one in normal condition.

Renew if any faults are present.

HPG T/A Shock

Because of gas pressure, strong resistance is felt when compressing shock.

To inspect shock operation, or if suspecting an internal leak between oil chamber and gas chamber, check shock as follows:

Install shock in a vise clamping on its bottom eyelet with its rod upward. Verify the compression stroke when the rod is fully extended.

Completely push down the shock rod then release.

The shock should extend unassisted. Rod must come out at a steady speed. If speed suddenly increases particularly at end of extension, replace shock.

If suspecting a shock is freezing, place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than one in normal condition.

Repair or replace if any faults are present. Refer to *SHOCK ABSORBER REBUILT PROCEDURE* at the end of this section.

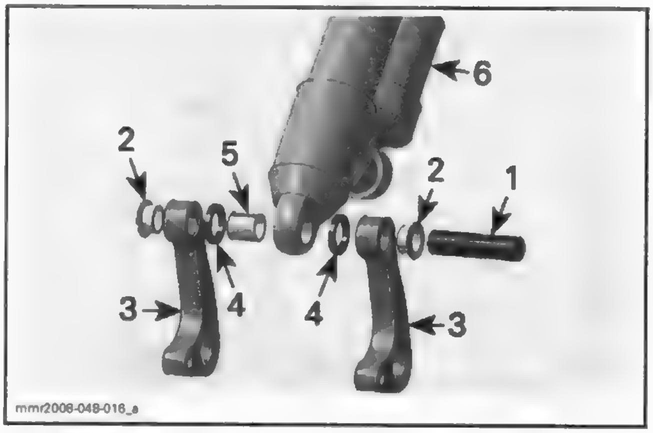
Rear Shock Absorber Installation

Installation is reverse of removal procedure. Pay attention to the following.

To ease shock installation, secure upper shock first.

GSX Series and MX Z Series

If the shock absorber has a remote reservoir, make sure to install the shock so that reservoir is facing down.



1. *Bar axle*
2. *Bushings*
3. *Rocker arms*
4. *Plastic spacers*
5. *Inner sleeve*
6. *Reservoir position*

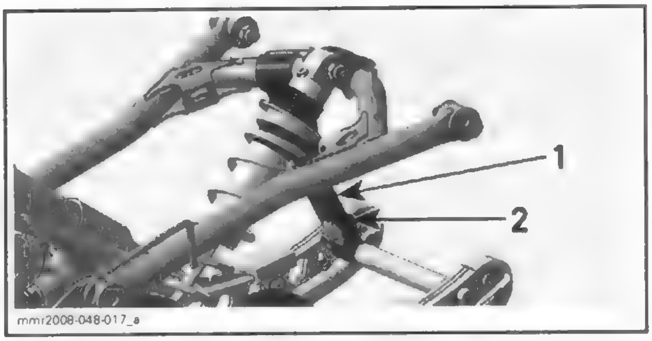
FRONT SHOCK ABSORBER

Front Shock Absorber Removal

Lift rear of vehicle and support it off the ground.

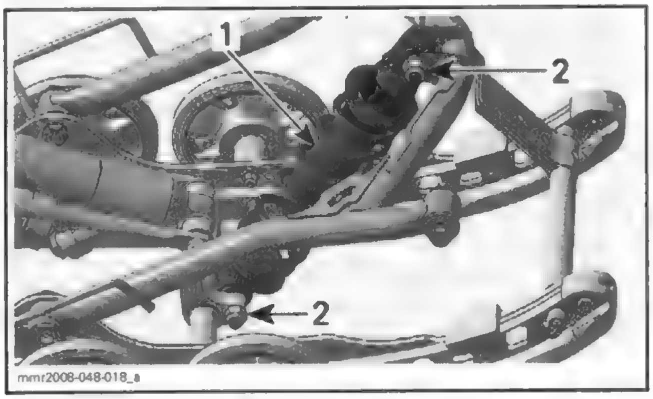
GSX Series and MX Z Series

Unfasten stopper strap.


1
2
mmr2008-048-017_a

1. *Stopper strap*
2. *Stopper strap bolt*

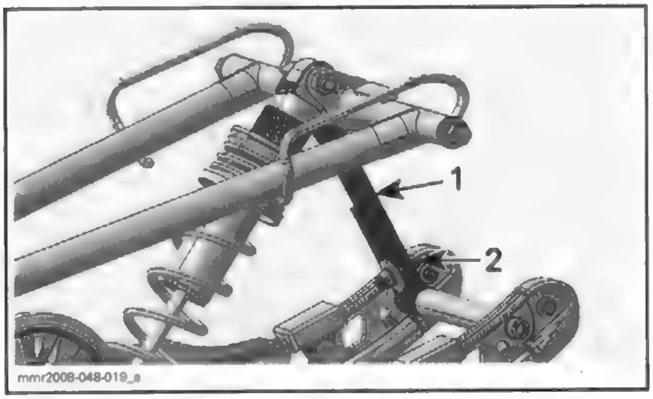
Remove bolts and nuts from shock.


1
2
2
mmr2008-048-018_a

1. *Front shock absorber*
2. *Remove bolts and nuts*

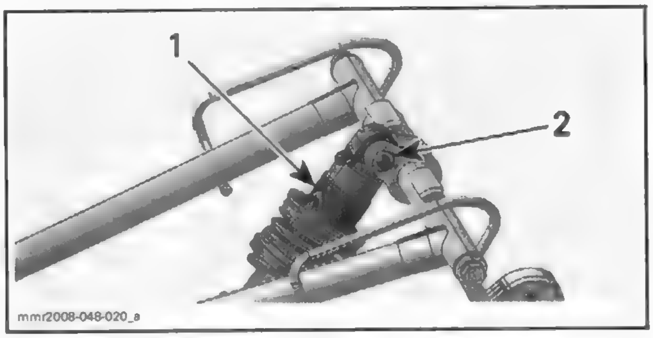
SUMMIT Series

Unfasten stopper strap.


1
2
mmr2008-048-019_a

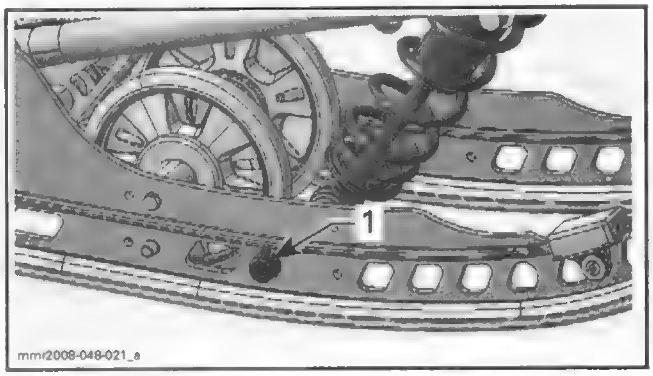
1. *Stopper strap*
2. *Stopper strap bolt*

Remove upper shock absorber bolt.


1
2
mmr2008-048-020_a

1. *Front shock absorber*
2. *Remove bolt and nut*

Remove socket screws (one each side) securing shock shaft.


1
mmr2008-048-021_a

1. *RH socket screw*

Remove shock absorber from vehicle.

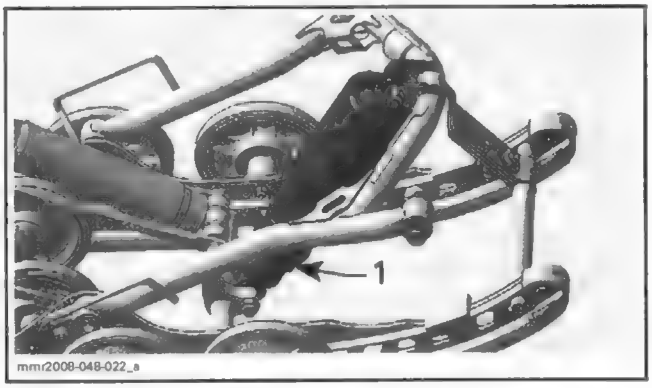
Remove bushings and shock shaft from shock absorber.

Front Shock Absorber Installation

Installation is reverse of removal procedure. Pay attention to the following details.

GSX (Sport) and MX Z (Trail)

Position the cam downwards.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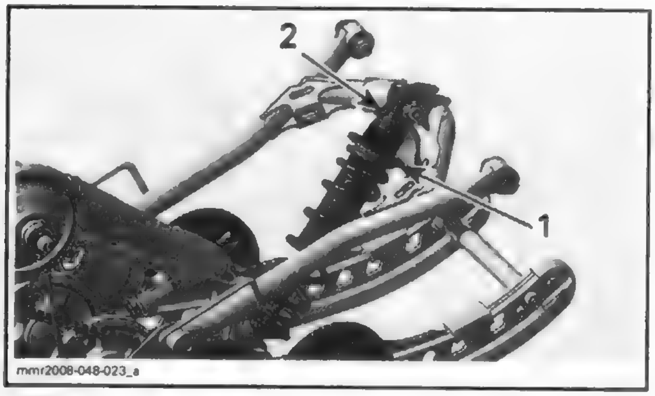
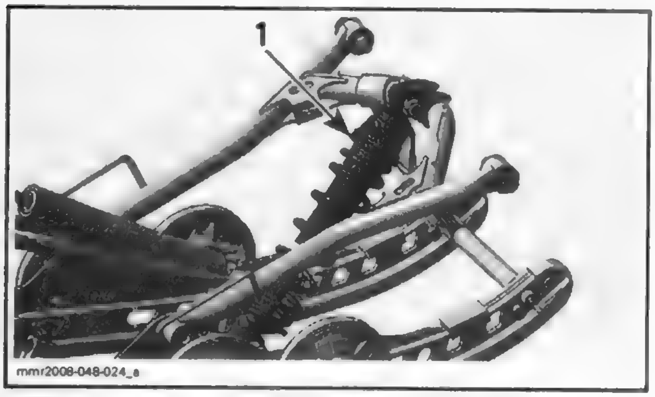
1. *Cam*

All Other Models

Position the adjustment ring or the cam upwards and the valve towards the tunnel.


2
1
mmr2008-048-023_a

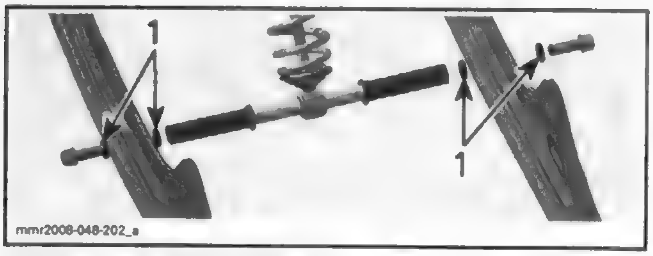
TYPICAL
1. *Adjustment ring*
2. *Valve*


1
mmr2008-048-024_a

TYPICAL
1. *Cam*

SUMMIT Series

Position washers in proper position.


1
1
mmr2008-048-202_a

BOTTOM OF SHOCK ABSORBER
1. *Washers location*

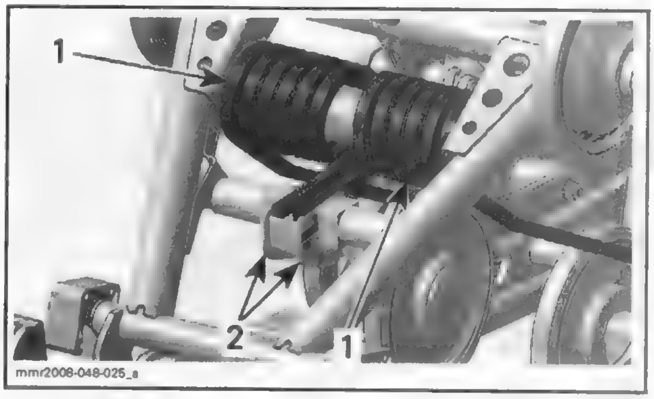
REAR SPRING

Rear Spring Removal

Lift rear of vehicle and support it off the ground.

GSX Series and MX Z Series

Decrease springs preload by turning cams accordingly.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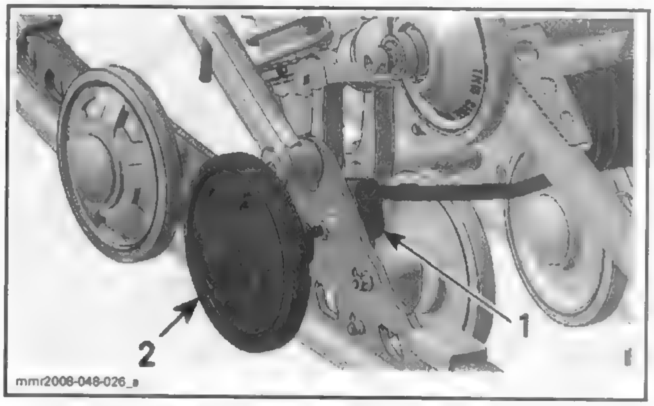
1. *Rear springs*
2. *Cams*

Remove idler wheels to have access to spring support screws.

Remove spring supports.


1
2
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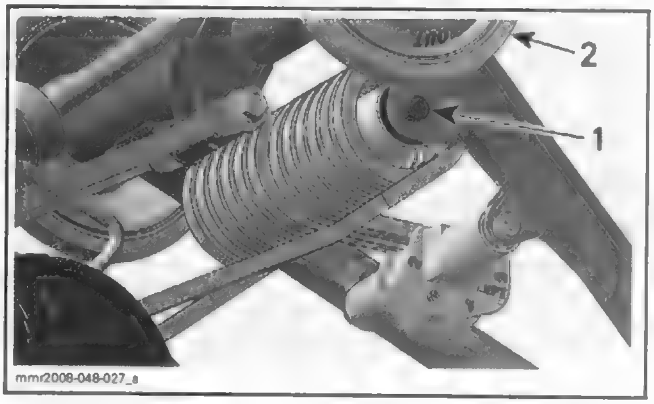
1. *LH spring support*
2. *Idler wheel*

Remove spring axle screws (one each side).


2
1
mmr2008-048-027_a

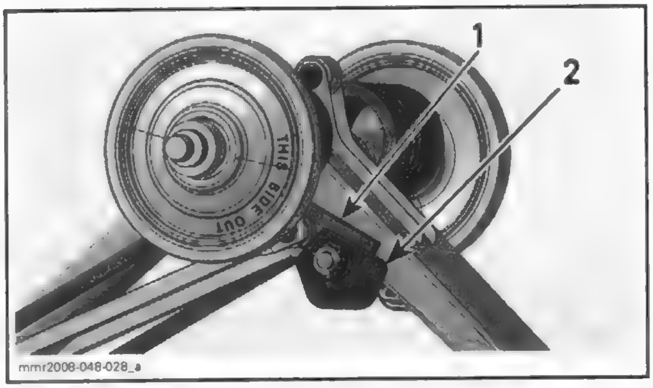
1. *Spring axle screw*
2. *Upper idler wheel*

Remove springs and spring axle.

SUMMIT Series

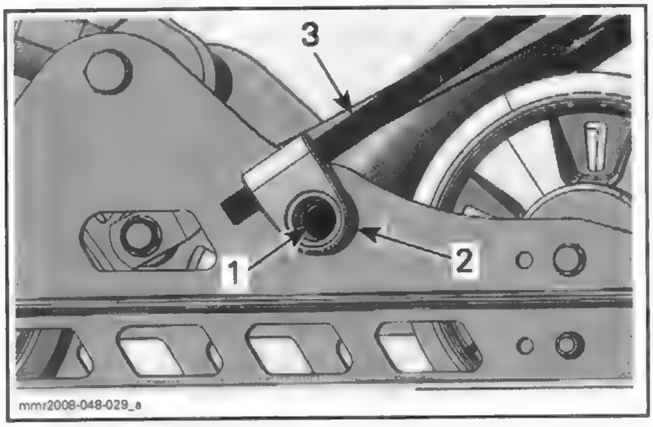
Completely loosen track tension by unscrewing both adjustment screws.

Decrease springs preload by turning cams accordingly.


1
2
THIS SIDE OUT
mmr2008-048-028_a

LH SIDE SHOWN
1. *Rear spring*
2. *Cam*

Unscrew spring supports (one each side).


3
1
2
mmr2008-048-029_a

1. *Spring support bolt*
2. *Spring support*
3. *Spring*

⚠ WARNING

Supports are spring loaded.

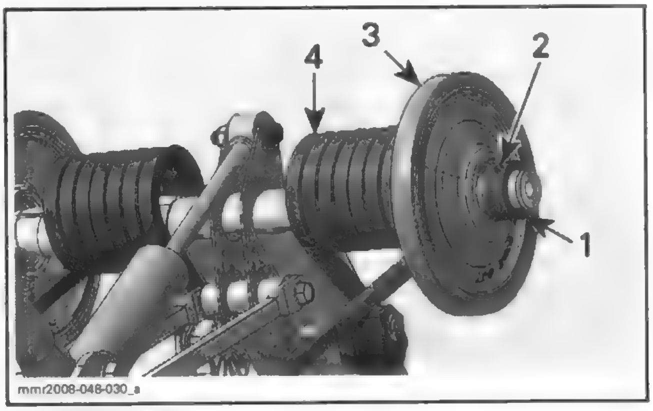
Remove screws and washers from rear arm top axle.

Loosen set screw from locking rings.

Remove locking rings.

Remove upper idler wheels.

Remove springs.


4
3
2
1
mmr2008-048-030_a

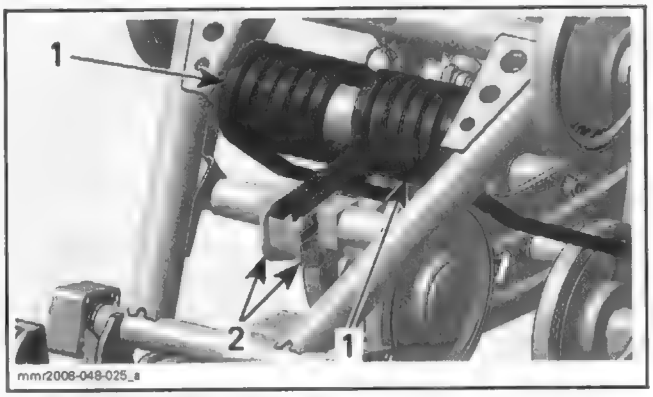
LH SIDE SHOWN
1. *Locking ring*
2. *Set screw*
3. *Upper idler wheel*
4. *Rear spring*

Rear Spring Installation

Installation is reverse of removal procedure. Pay attention to the following.

Respect THIS SIDE OUT inscription on top idler wheels.

Make sure that spring end is in cam adjuster.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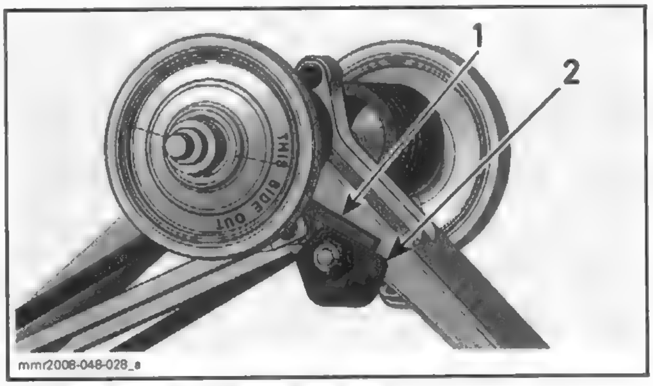
mmr2008-048-025_a

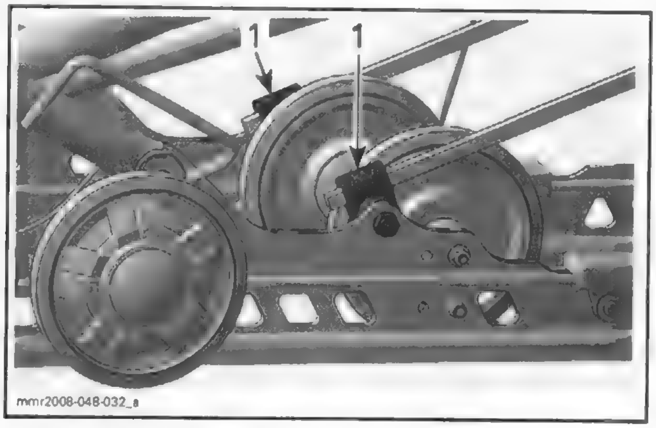
GSX SERIES AND MX Z SERIES
1. *Rear springs*
2. *Cams*


1
2
THIS SIDE OUT
mmr2008-048-028_a

SUMMIT SERIES — LH SIDE SHOWN
1. *Spring end*
2. *Cam*

Install spring supports upwards.

MX Z (Renegade and Renegade X)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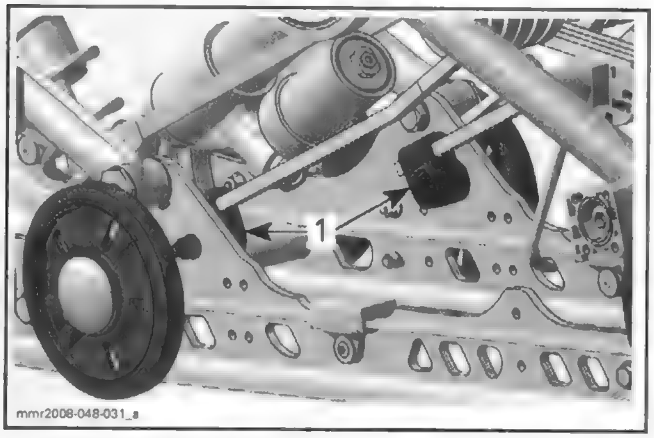
1. Spring supports upwards

GSX Series and MX Z (Adrenaline, TNT, Trail and X)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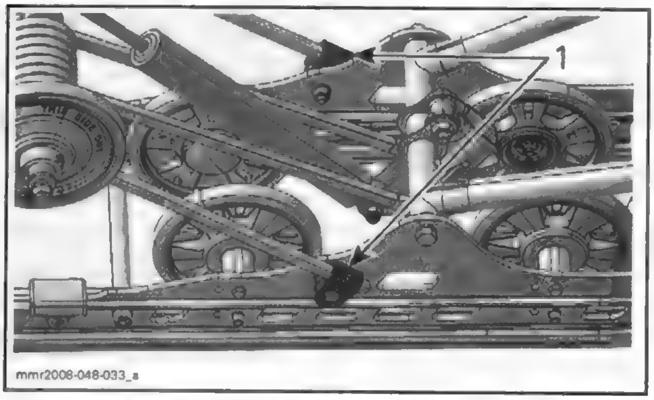
1. Spring supports upwards

SUMMIT Series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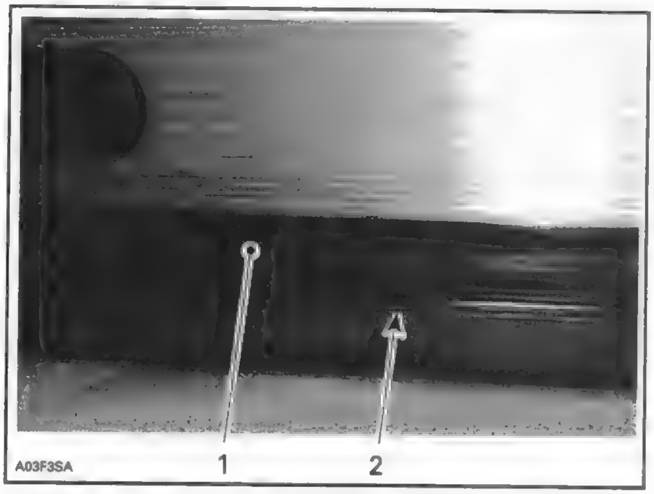
1. Spring supports upwards

SLIDER SHOE

Slider Shoe Inspection

Replace slider shoes when the wear reach 1 - 2 mm (.040 - .079 in) beyond the moulding line.



TYPICAL
1. *Slider shoe*
2. *Molding line*

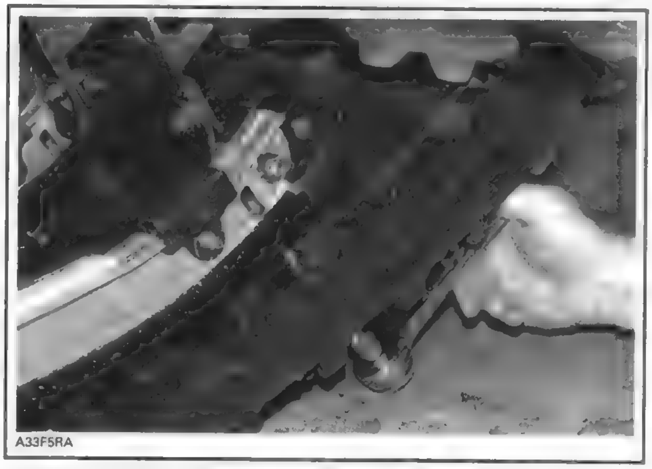
CAUTION: Slider shoes must always be replaced in pairs.

Slider Shoe Removal

Lift rear of vehicle and support it off the ground.

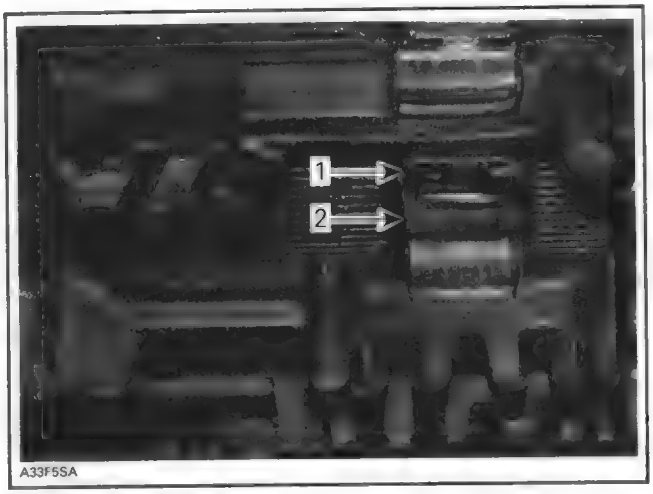
Completely loosen track tension.

Remove nut and screw of each runner.



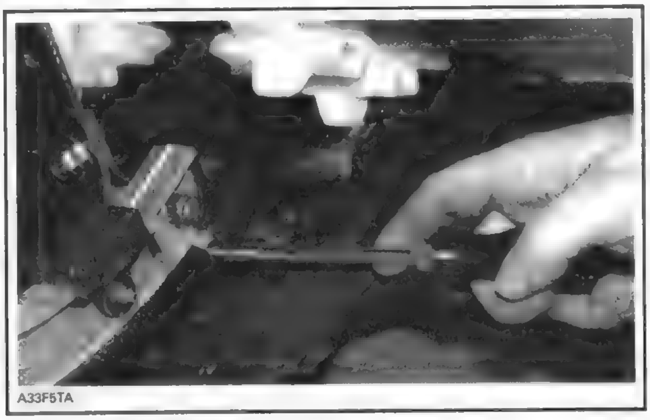
REMOVE NUT AND SCREW OF EACH RUNNER

Align track window with slider shoe.



TYPICAL
1. *Track window*
2. *Slider shoe*

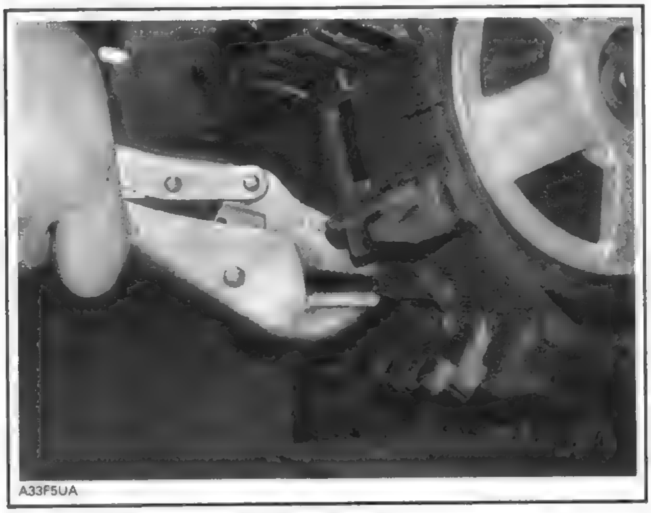
Using a pry bar or screw driver, push slider shoe until it comes in contact with track.



PUSH ON SLIDER SHOE

Using locking pliers, pull slider shoe through track window to remove.

NOTE: If necessary, lubricate track window to facilitate slider shoe removal.



PULL ON SLIDER SHOE TO REMOVE

Slider Shoe Installation

Installation is reverse of removal procedure. Pay attention to the following detail.

Make sure to insert slider shoe end with hole first.

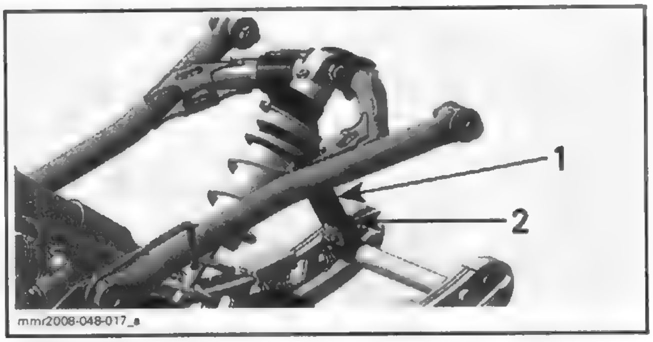
FRONT ARM

Front Arm Removal

GSX Series and MX Z Series

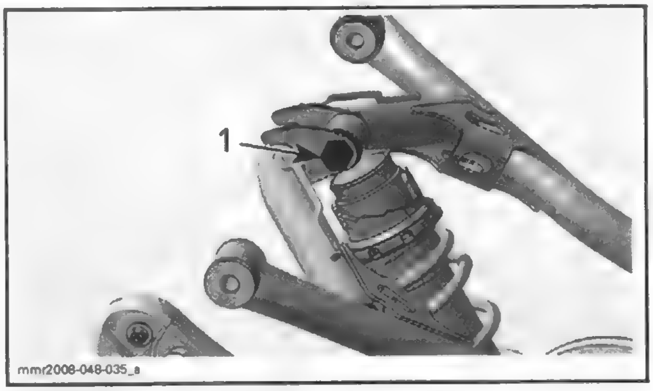
Remove *SUSPENSION ASSEMBLY*, see procedure in this section.

Unfasten stopper strap.



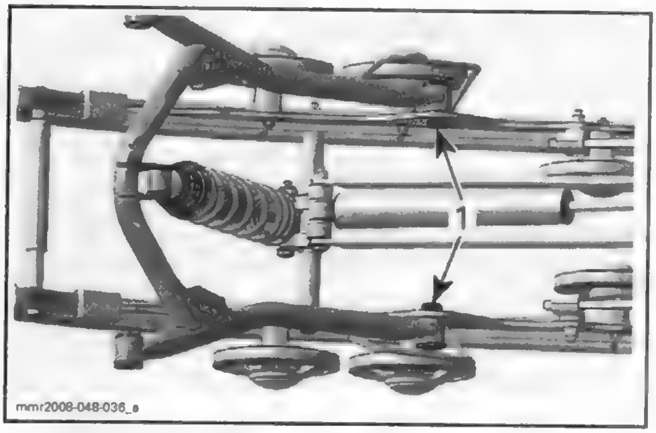
1. *Stopper strap*
2. *Stopper strap bolt*

Remove upper bolt securing the front shock absorber.



1. *Shock absorber upper bolt*

Unscrew bolts securing the bottom ends of front arm.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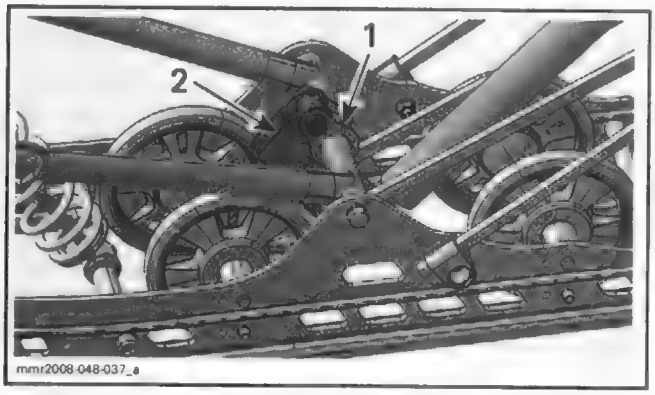
1. Front arm lower bolts

SUMMIT Series

Lift rear of vehicle and support it off the ground.

Remove bolt securing rocker to front arm.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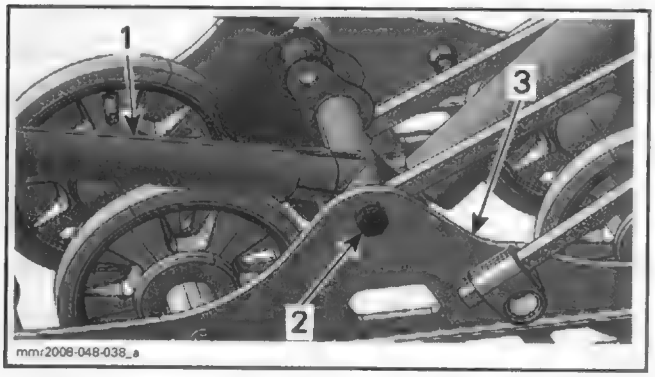
1. Front arm
2. Rocker

Unscrew and remove the front arm lower bolts and washers.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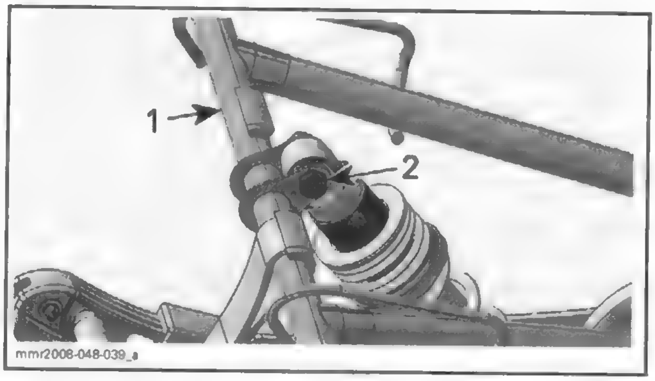
1. Front arm
2. Lower bolt
3. LH runner

Remove the shock absorber upper bolt.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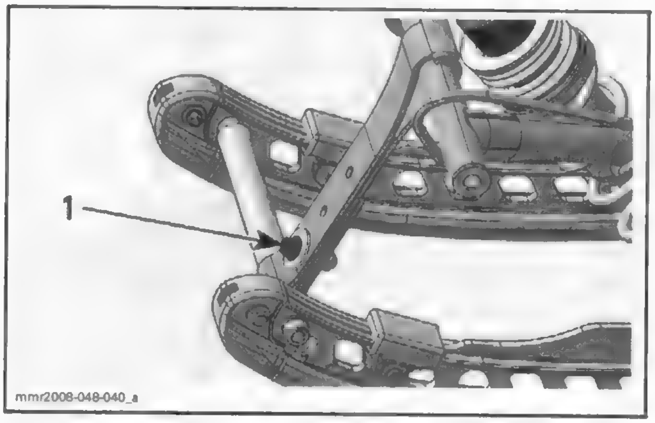
1. Front arm
2. Shock absorber upper bolt

Unfasten stopper strap.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1. Stopper strap bolt

Remove and discard front arm upper bolts.

1
mmr2008-048-041_a

1. Bolt

Remove front arm.

Front Arm Installation

Installation is reverse of removal procedure. Pay attention to the following details.

Install front arm bolts. On **SUMMIT models**, install NEW bolts.

Torque them to 48 N•m (35 lbf•ft).

To properly hold front arm axles when applying tightening torque to front arm lower bolts, it may be necessary to remove idle wheels.

REAR ARM

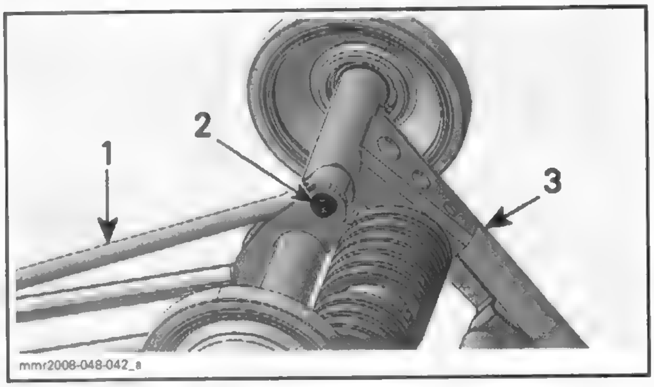
Rear Arm Removal

Lift rear of vehicle and support it off the ground.

Completely loosen track tension.

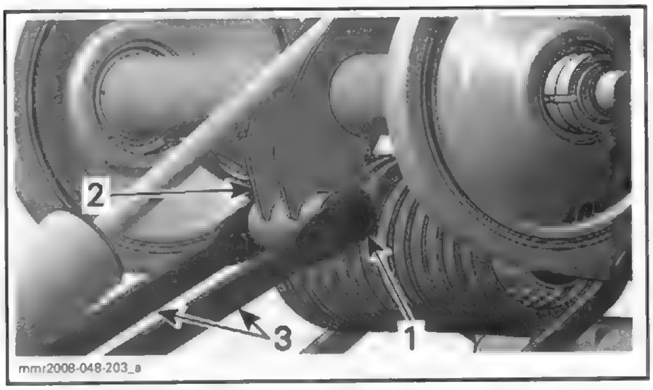
GSX Series and MX Z Series

Remove rear shock absorber upper bolt.



1. *Rear shock absorber*
2. *Shock absorber bolt*
3. *Rear arm*

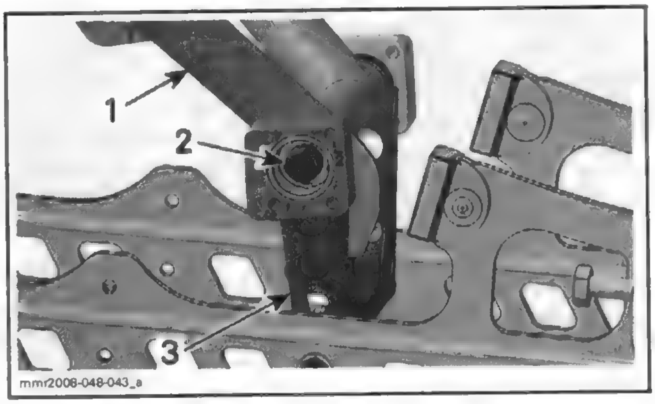
Remove bolt securing throttle rods to rear arm.



1. *Throttle rod bolt*
2. *Rear arm*
3. *Throttle rods*

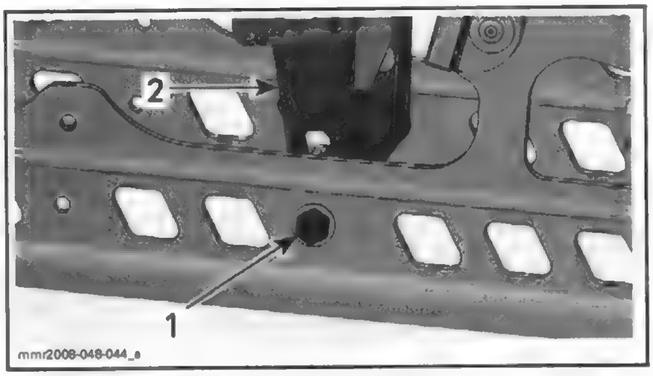
Remove *REAR SPRING*, see procedure in this section.

Loosen coupling block screws securing rear arm to pivot arm.



1. *Rear arm*
2. *LH coupling block bolt*
3. *Pivot arm*

Remove bolts and washers holding pivot arm to runners.



1. *LH pivot arm bolt*
2. *Pivot arm*

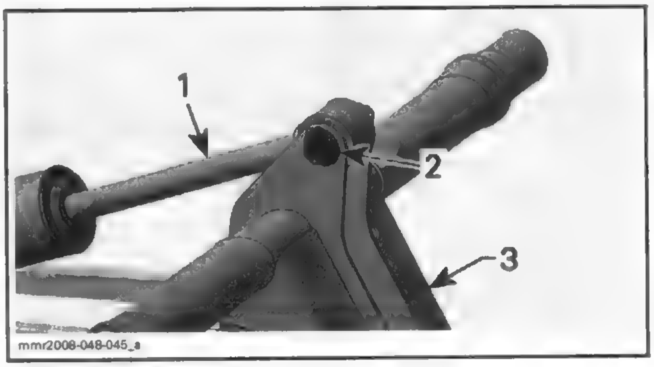
Remove rear arm.

Separate pivot arm from rear arm. Discard coupling block screws.

SUMMIT Series

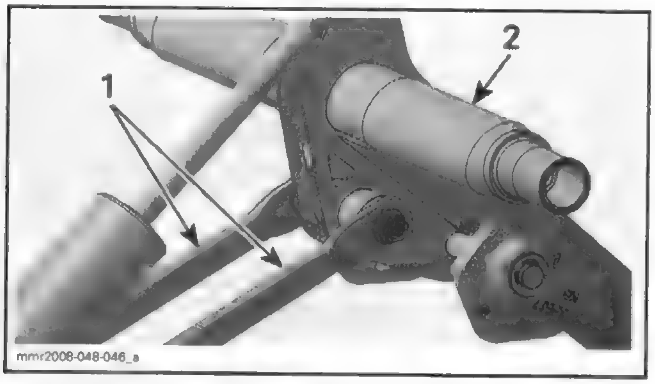
Remove *REAR SPRING*, see procedure in this section.

Remove the rear shock absorber upper bolt.



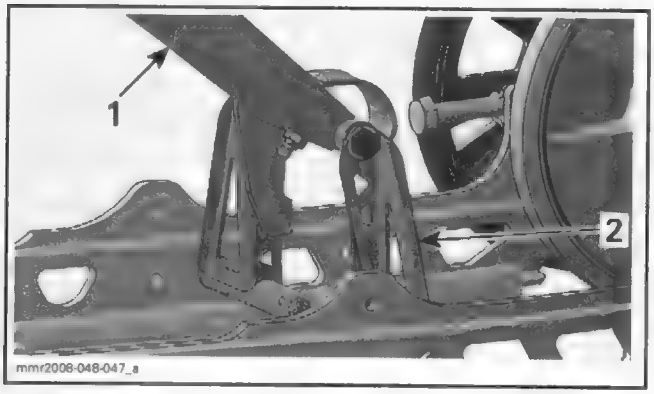
1. *Rear shock absorber*
2. *Shock absorber bolt*
3. *Rear arm*

Remove throttle rods from rear arm.



1. *Throttle rods*
2. *Rear arm*

Remove bolts and washers holding rear arm to pivot arm.



1. *Rear arm*
2. *Pivot arm*

Rear Arm Installation

Installation is reverse of removal procedure. Pay attention to the following details.

Pivot arm grease fitting must be towards the front of the vehicle.

At installation, rear arm stroke limiter must be on rear side.

GSX Series and MX Z Series

Install coupling block with **NEW** socket screws.

All Models

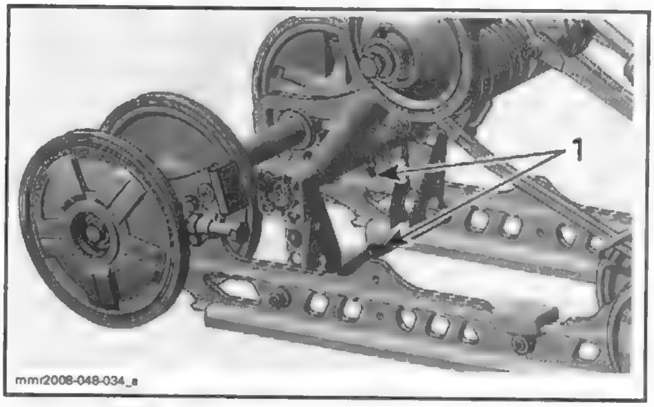
Install **NEW** rear arm bolts and tighten them.

REAR ARM BOLTS TIGHTENING	
GSX Series and MX Z Series	85 N•m (63 lbf•ft)
SUMMIT Series	48 N•m (35 lbf•ft)

Rear Arm Lubrication

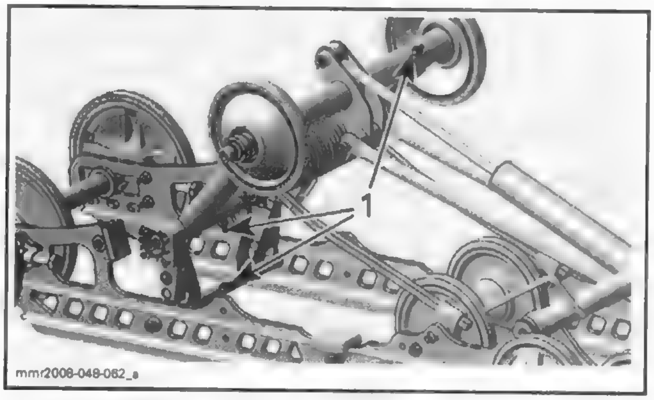
Lubricate pivot arm and rear arm at grease fittings using suspension synthetic grease (P/N 293 550 033).

GSX Series



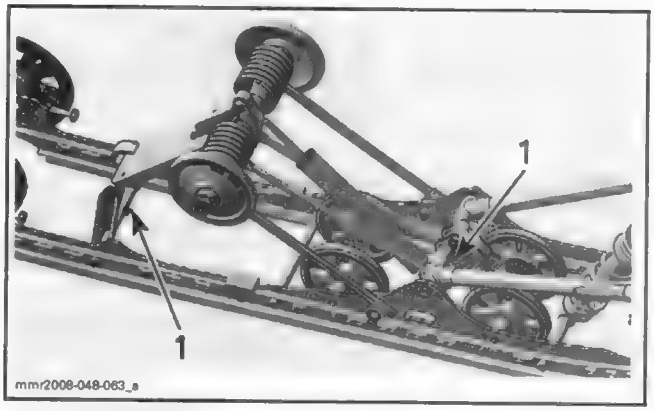
1. *Grease fittings*

MX Z Series



1. *Grease fittings*

SUMMIT Series

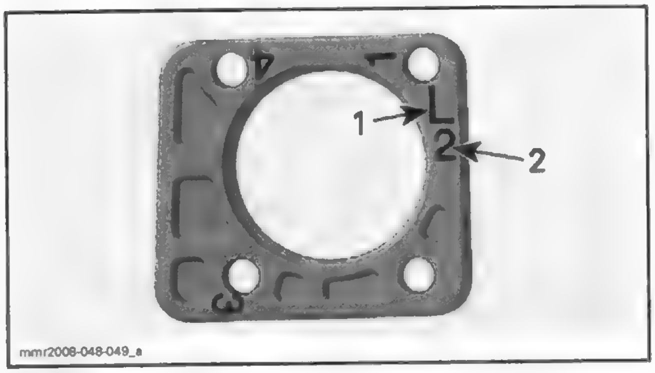


1. *Grease fittings*

COUPLING BLOCK

GSX Series and MX Z Series

Both coupling blocks are identified "R" or "L" (right or left) and have position number (from 1 to 4). At installation make sure to install proper block on proper side with the same adjustment position on both sides.



TYPICAL
1. *Blocks are identified "R" or "L" (right or left)*
2. *Blocks position number (from 1 to 4)*

MODELS	BLOCK POSITION
All models	1

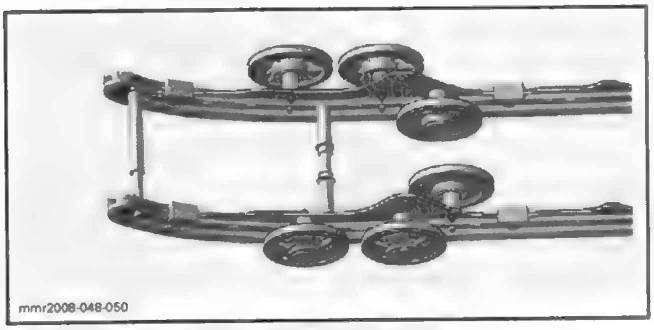
Insert the dowel pin located at the back of coupling block into pivot arm hole.

Install **NEW** coupling block screws.

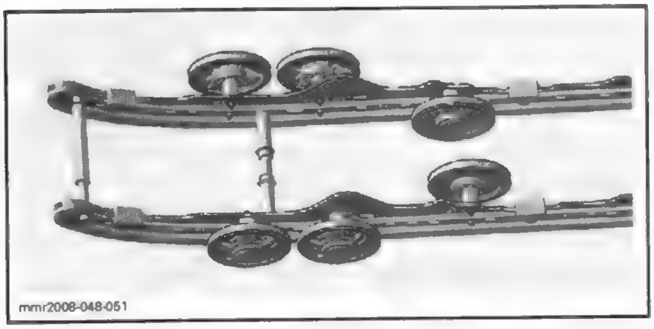
IDLER WHEELS

Refer to illustration for idler wheels position at installation.

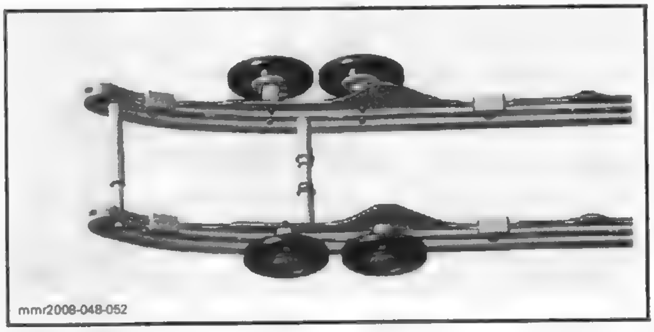
GSX Series and MX Z (Adrenaline, Trail and X)



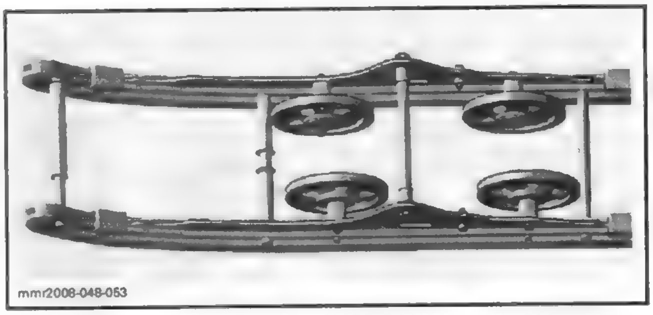
MX Z (Renegade, Renegade X)



MX Z (TNT)



SUMMIT Series



IDLER WHEEL SUPPORT

Idler wheel supports are retained with a bolt and a HUCK rivet. To remove HUCK rivet, refer to *FRAME* for proper procedure.

Replace the HUCK rivets by the following fasteners.

NEW FASTENERS	
Hexagonal flanged bolt M6 x 25	(P/N 207 662 544)
Hexagonal flanged elastic stop nut M6	(P/N 233 261 414)

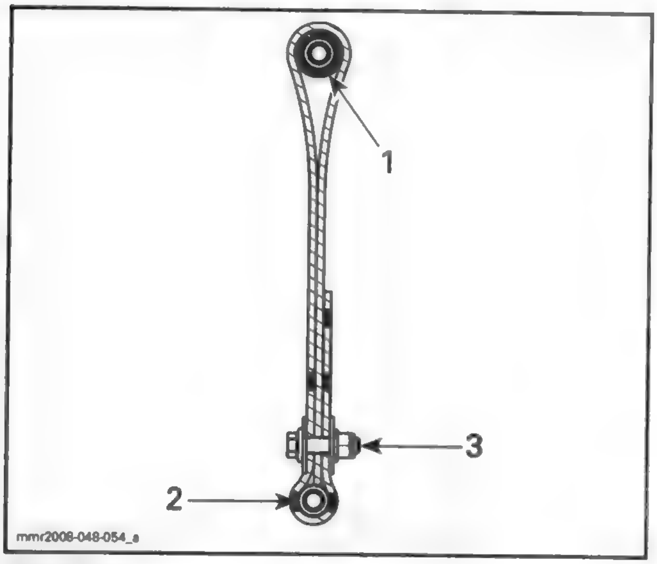
STOPPER STRAP

Inspect strap for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required.

Make sure it is attached through proper hole from the end.

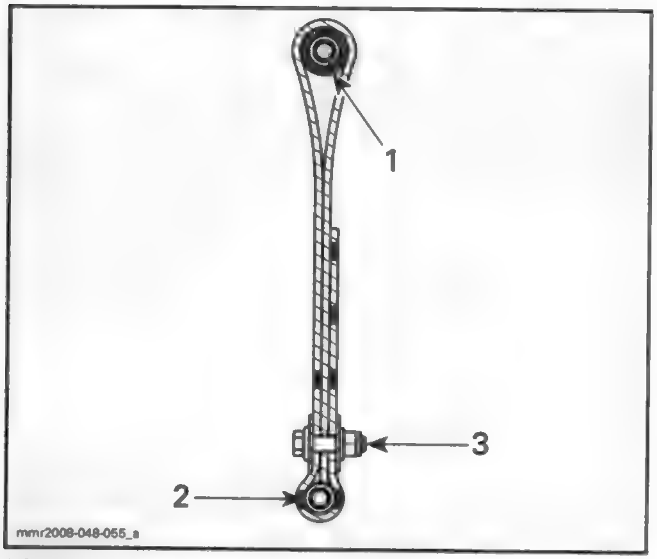
Torque nut to 11 N•m (97 lbf•**in**).

GSX (Limited, Sport) and MX Z Series



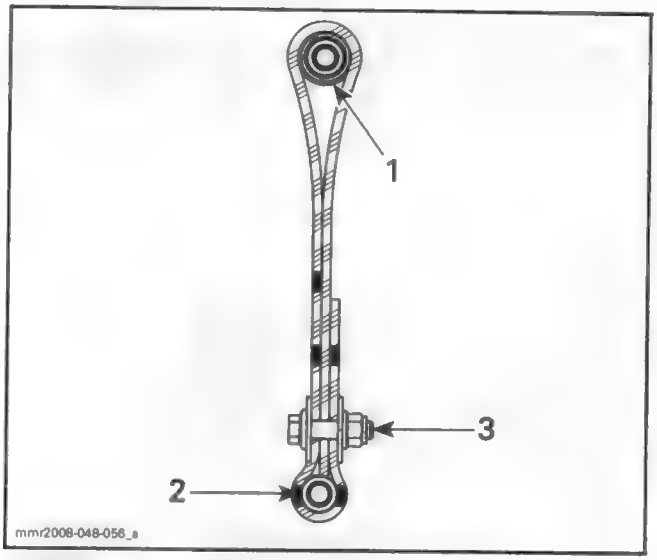
POSITION 3
1. *Front arm (top)*
2. *Front axle*
3. *Towards the rear of vehicle*

GSX (Limited Touring)



POSITION 4
1. *Front arm (top)*
2. *Front axle*
3. *Towards the rear of vehicle*

SUMMIT Series



POSITION 2
1. *Front arm (top)*
2. *Front axle*
3. *Towards the rear of vehicle*

REPAIR

SHOCK ABSORBER REBUILT PROCEDURE

HPG T/A Rebuilt Procedure

There are two types of high pressure gas take apart (HPG T/A) shock. One type has a tire valve and the other has a needle valve.

SHOCK TYPE	INFLATION TOOL
Tire valve type	529 035 570
Needle valve type	503 190 102

HPG T/A shocks come in two sizes. C-36 shock is 36 mm (1.417 in) in diameter and C-46 shock is 46 mm (1.811 in).

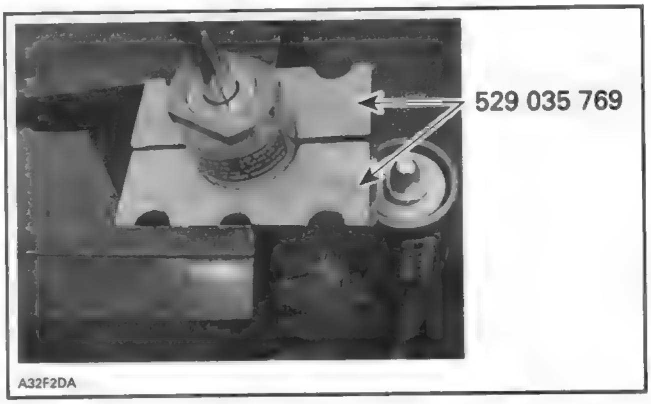
SHOCK SIZE	SERVICING TOOL	P/N
C-36	Piston guide	529 026 600
	Seal guide	529 026 500
	Shock wrench	529 035 727
C-46	Piston guide	529 035 608
	Seal guide	529 035 728
	Shock wrench	529 035 727

Release nitrogen (N) pressure on any HPG T/A shock with internal floating piston (IFP).

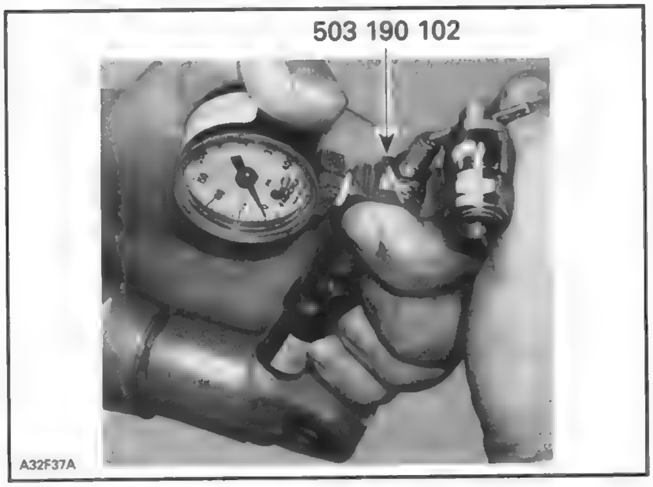
⚠ WARNING

Nitrogen gas is under extreme pressure. Use caution when releasing this gas volume. Protective eye wear should be used.

Mount shock in a vise with the HPG shock holding tool (P/N 529 035 769).



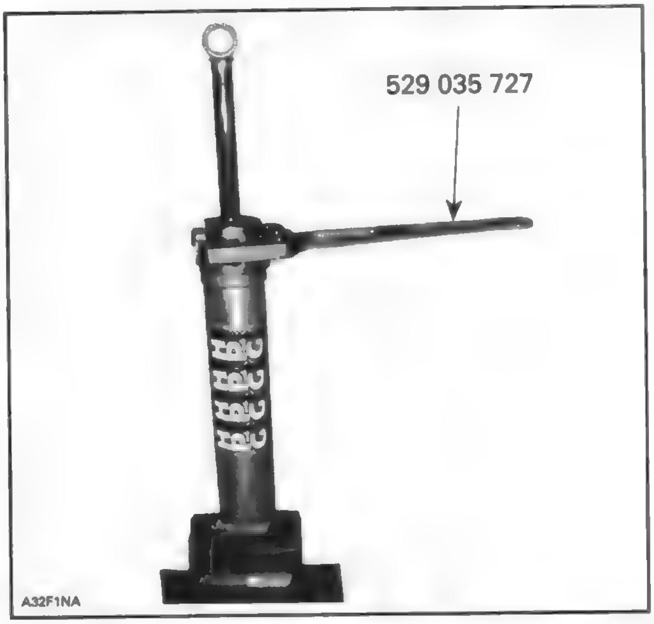
Remove screw on top of valve. Place the needle guide of gas fill tool kit (P/N 503 190 102) on the shock valve. Press the detent pin and push forward the needle assembly very slowly towards rubber of needle valve. Push on shock tool valve center rod to release gas pressure.



Remove tool from shock.

Screw Cap Type HPG T/A Shock

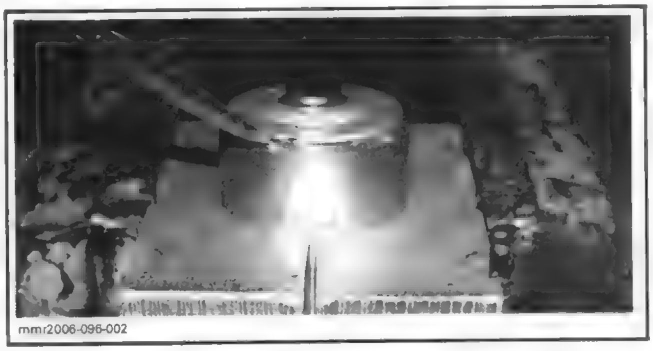
Using the shock wrench (P/N 529 035 727), unscrew seal carrier.



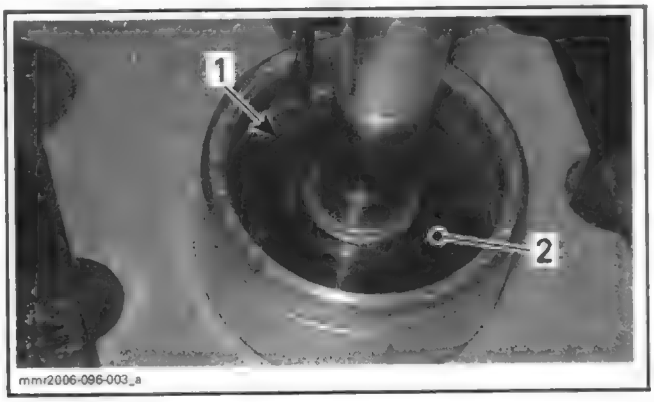
TYPICAL

Snap Ring Cap Type HPG T/A Shock

Using a flat tool (small screwdriver or small chisel), pop-out the cap.



Compress the carrier to access and using a pick, remove the snap ring.

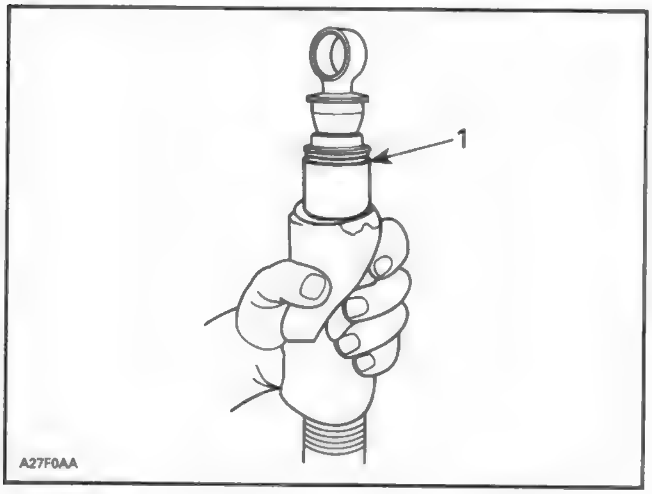


1. *Snap ring*
2. *Carrier*

All HPG T/A Shocks

With the seal carrier removed, slowly lift and remove damper rod assembly from the damper body.

NOTE: Remove damper rod assembly slowly to reduce oil spillage and prevent piston seal damage by damper body threads. Wrap the damper body with a shop cloth to capture possible overflow oil while removing the damper piston.

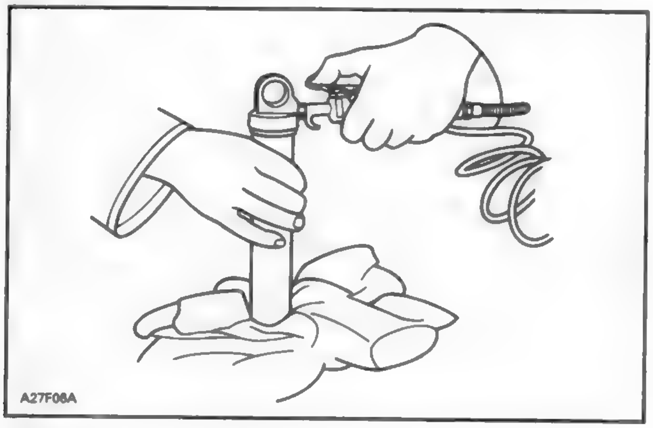


1. Oil flows

Discard old oil into storage container. Never reuse damper oil during shock rebuild.

HPG T/A Shock without Remote Reservoir

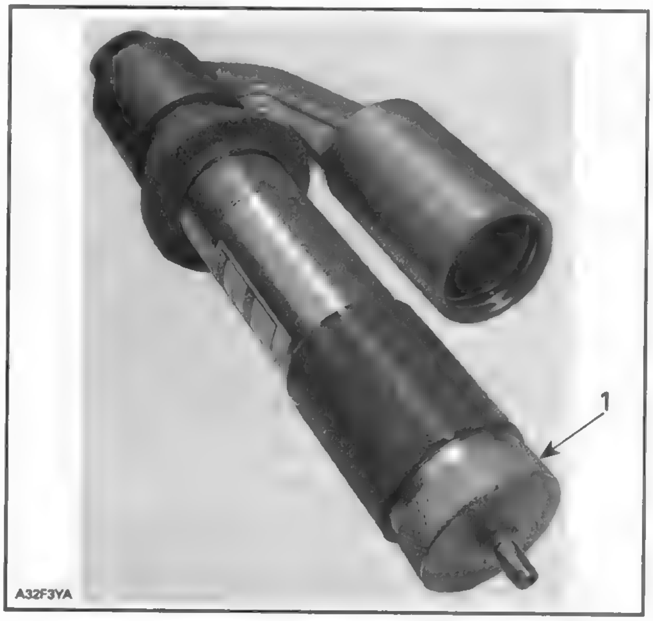
Remove valve core. Using compressed air pressure, carefully remove floating piston from damper body. Hold shop cloth over damper body opening to catch released floating piston. Allow room for floating piston to leave damper body.



TYPICAL

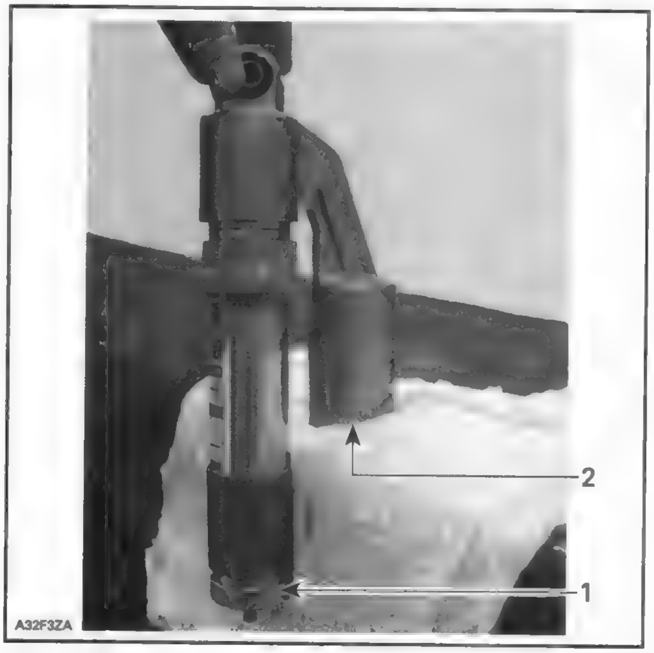
HPG T/A Shock with Remote Reservoir

Install the floating piston remover tool (P/N 529 035 907) on shock absorber, as shown below.



1. Floating piston remover tool

Place shock absorber in a position where remote gas reservoir opened extremity is blocked. Refer to following photo.



1. Tool
2. Reservoir opened extremity blocked by leaning on work bench

With the vacuum/pressure pump (P/N 529 021 800), pressurize shock absorber until remote reservoir piston pops-out.

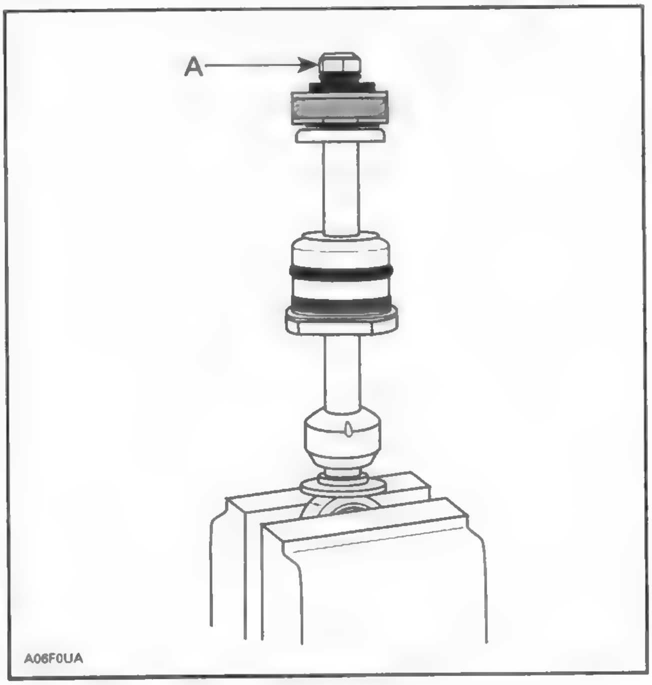
NOTE: Use towels to prevent damaging remote reservoir piston when it pops-out.

Thoroughly clean, with a typical cleaning solution, and blow dry using low pressure air. Carefully inspect the damper body for any imperfections or signs of wear in the damper bore.

Replace damper body if wear is identified.

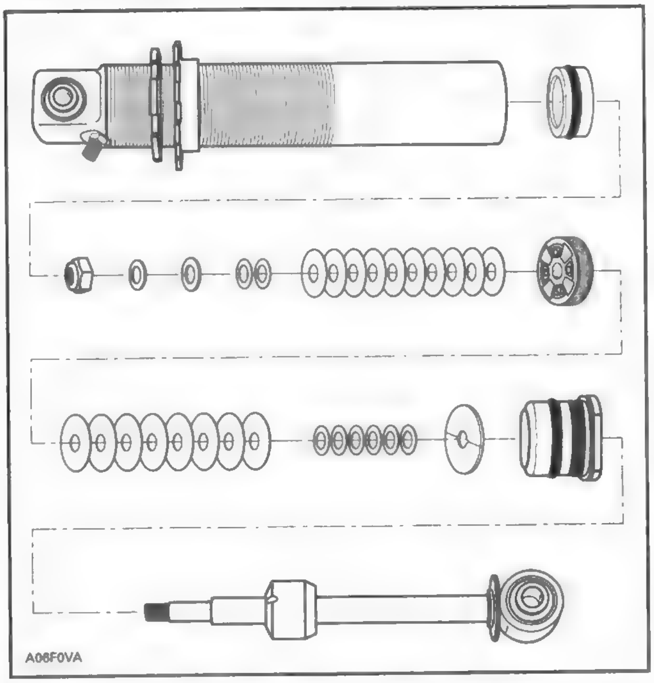
All HPG T/A Shocks

Holding the damper rod assembly in a bench vise, begin piston and valve removal.



A. Remove damper rod nut

Always arrange parts removed in the sequence of disassembly.

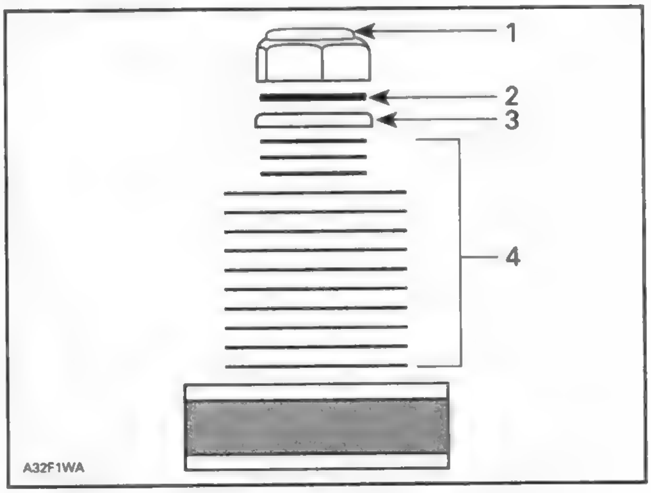


If revalving is to be done, it is imperative that you identify the original shim pack (size and number of shims). There is no need to remove seal carrier if only revalving is to be done.

Shims can be measured by using a vernier caliper or a micrometer.

NOTE: All shims should be carefully inspected and any bent or broken shims must be replaced for the shock to function properly.

After the new or replacement shim pack has been selected, reassemble in the reverse order of disassembly. Torque damper rod nut to 18 N•m (159 lbf•**in**).



1. Damper rod nut
2. Spacer
3. Stopper with its round edge facing nut
4. Shim pack

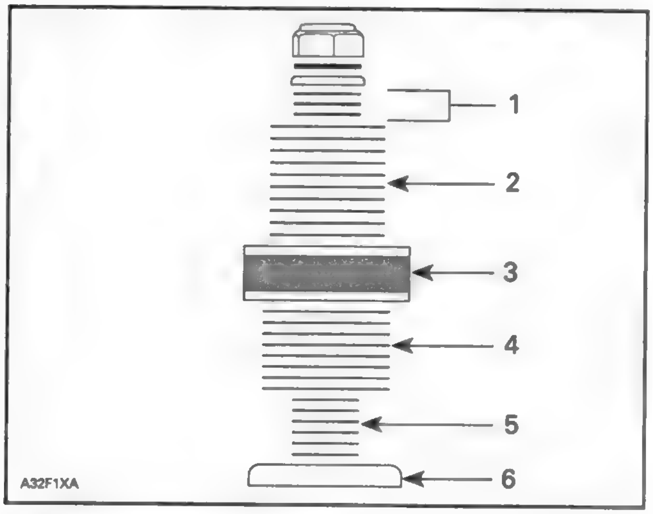
As a general rule, we suggest replacing the damper rod nut after 4 rebuilds to ensure proper locking friction and the use of Loctite 271 (red) (P/N 293 800 005) each time.

CAUTION: Do not substitute the damper rod nut for non - O.E.M.

This (these) spacer washer(s) must be used as shown to ensure damper rod nut does not bottom out or contact shaft threads.

Rebound valve stopper with round edge facing nut.

NOTE: Rebound shim stack must not reach into threads of damper rod. Spacer under damper rod nut is used to prevent damper rod nut from bottoming on threads.

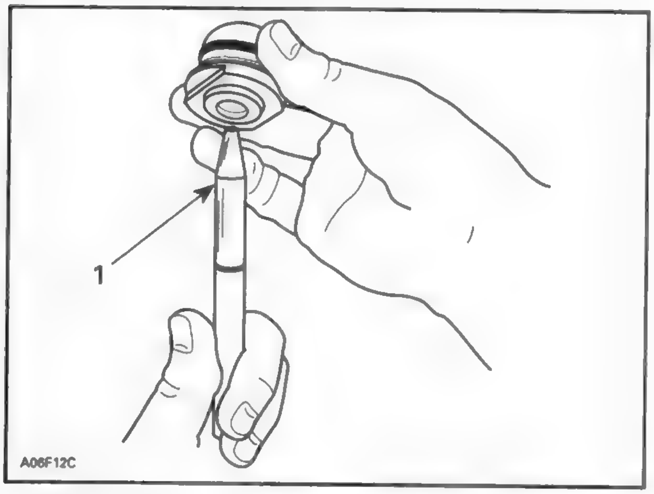


1. *Rebound dampening shim pack*
2. *Rebound dampening shim pack*
3. *Piston*
4. *Compression dampening shim pack*
5. *Compression dampening shim pack*
6. *Stopper*

If the seal carrier assembly is replaced, use seal pilot to guide seal over damper rod. Lubricate seal carrier guide pilot before use.

CAUTION: Failure to use seal pilot will result in seal damage.

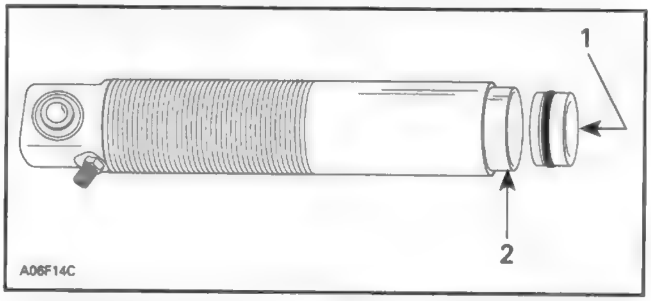
Reassemble damper rod assembly, taking care to properly assemble shim packs as required for your dampening needs. Ensure that the shaft piston is installed with the slits/larger intake holes facing the rebound shim stack.



1. *Seal guide*

If internal floating piston has been removed, reinstall it into damper body (ensure that valve core has been removed). Use Molykote G-n (P/N 420 297 433) to ease O-ring past damper body threads with floating piston guide.

CAUTION: Failure to install internal floating piston correctly could result in shock damage.

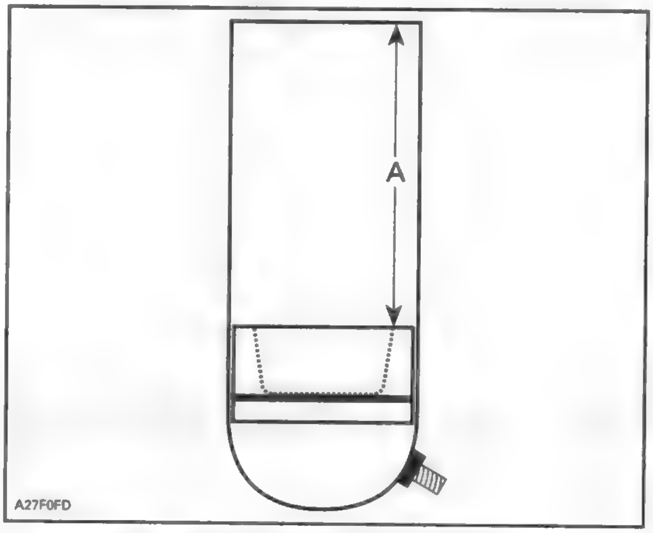


1. *Push (slowly) by hand*
2. *Floating piston guide*

Lubricate inside of piston guide with Molykote G-n (P/N 420 297 433).

Install floating piston to the proper depth refer to following the table.

On all HPG T/A shocks, the floating piston is installed hollow side up.



A. *Installation distance for floating piston installation*

SHOCK P/N	INSTALLATION DISTANCE OF FLOATING PISTON mm (in)
503 191 585	54.5 (2-9/64)
503 191 586	
503 191 814	
503 191 816	
503 191 532	119.5 (4-45/64)
503 191 791	
503 191 797	
503 191 812	
505 072 381	160 (6-19/64)
505 072 262	164 (6-15/32)
505 071 991	167 (6-37/64)
505 072 232	
503 191 534	171.5 (6-3/4)
503 191 801	

NOTE: If the floating piston is installed too far into the damper body, light air pressure through valve (with core removed) will move piston outward.

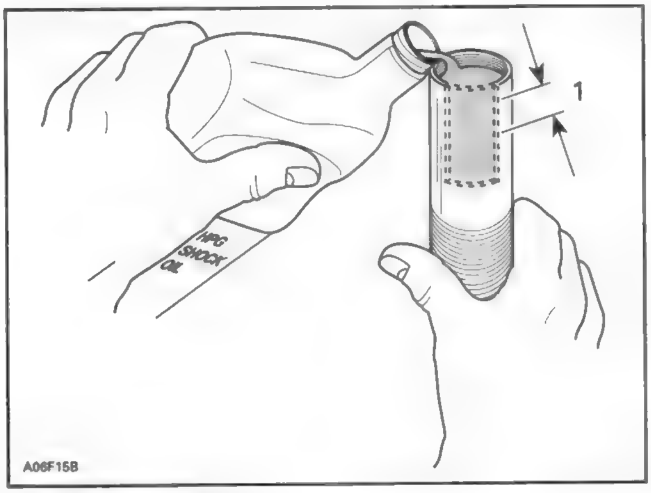
Reinstall tire valve core after internal floating piston has been installed at the correct height and before adding oil.

⚠ WARNING

Whenever using compressed air exercise extreme caution, cover damper opening with shop cloth to reduce chance of possible injury.

CAUTION: Moisture laden compressed air will contaminate the gas chamber and rust floating piston.

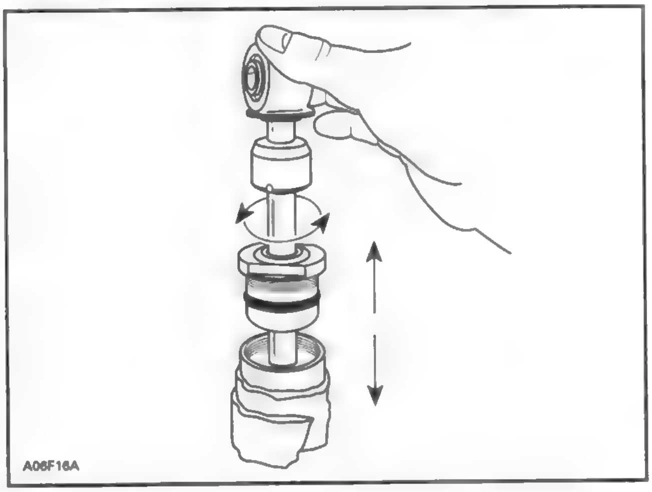
Fill the shock with shock absorber oil (P/N 293 600 035) to approximately 10 mm (3/8 in), from the base of seal carrier threads.



1. Fill to 10 mm (3/8 in)

NOTE: Although we do not measure the exact amount of oil added to the damper, approximately 252 mL (8.52 oz. U.S.) will be used.

Carefully insert damper rod into the damper body. Lightly oil damper piston seal ring with shock oil to ease installation.



NOTE: Some shock oil will overflow when installing damper. Wrap damper with shop cloth to catch possible overflow oil.

CAUTION: Use care when passing piston into damper body at damper body threads.

Slight oscillation of damper rod may be required to allow piston to enter damper body bore.

Slowly push piston into damper body. Slight up and down movement may be required on short stroke to allow all air to pass through piston assembly. The gentle tapping of a small wrench, on the shock eye, may help dislodge air trapped in the submersed piston. Be careful not to drive the shaft any deeper into the oil than is necessary to just cover the shim stack.

NOTE: Fast installation of the damper rod may displace the floating piston from its original position. This must not occur if the damper is expected to perform as designed.

With damper rod piston into oil, TOP OFF damper oil volume. Oil level should be to damper body thread base.

Screw Cap Type HPG T/A Shock

Seal carrier assembly can now be threaded into damper body. This should be done slowly to allow weapage of oil and to minimize internal floating piston displacement. Torque seal carrier to 65 N•m (48 lbf•ft).

Snap Ring Cap Type HPG T/A Shock

Seal carrier assembly can now be pushed into damper body to pass snap ring groove. Install snap ring into groove.

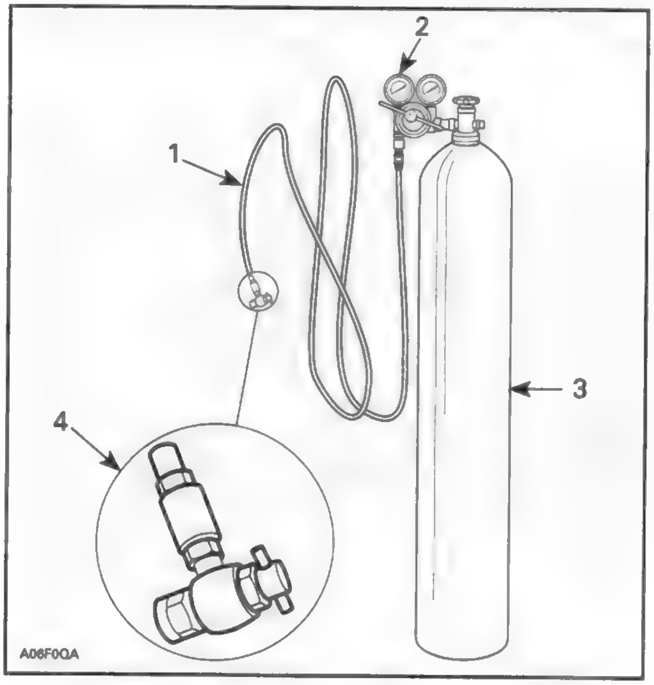
Tap the cap on the shock body.

All HPG T/A Shocks

After the seal carrier is fully in place avoid pushing the shaft into the body until the nitrogen charge is added.

When removing and retightening the tire valve acorn nut use minimal torque. When the cap is over tightened and subsequently removed it may prematurely break the seal of the tire valve to the shock body and cause a loss of nitrogen charge without being noticed. If you suspect this has happened then recharge the shock as a precaution. Inspect the tire valve cap before installation to ensure that the internal rubber gasket is in its proper position.

Nitrogen (N) can now be added to damper body.



1. *High pressure hose*
2. *Stage regulator, delivery pressure range 2070 kPa (300 PSI)*
3. *High pressure cylinder filled with industrial grade nitrogen*
4. *Valve tip (P/N 529 035 570) permanently installed*

NOTE: Never substitute another gas for nitrogen. Nitrogen has been selected for its inert qualities and will not contaminate the gas chamber of the shock.

Preset your pressure regulator to 2070 kPa (300 PSI) nitrogen (N), this gas pressure will restore the correct pressure for your damper.

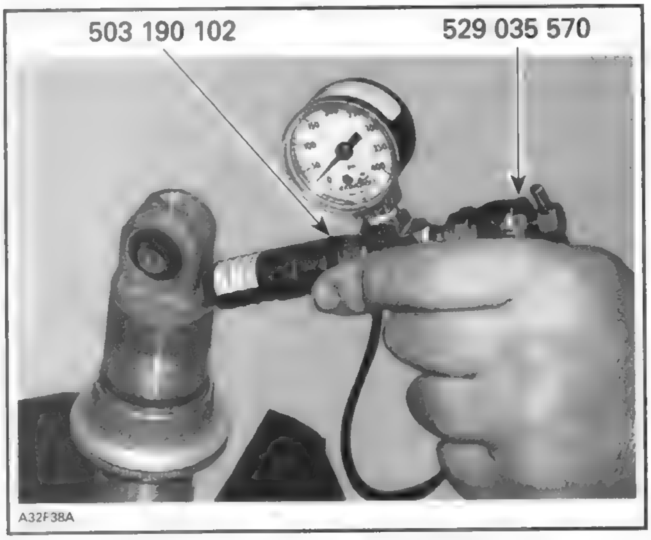
CAUTION: Do not exceed the recommended pressure values.

⚠ WARNING

Whenever working with high pressure gas, use eye wear protection. Never direct gas pressure toward anybody.

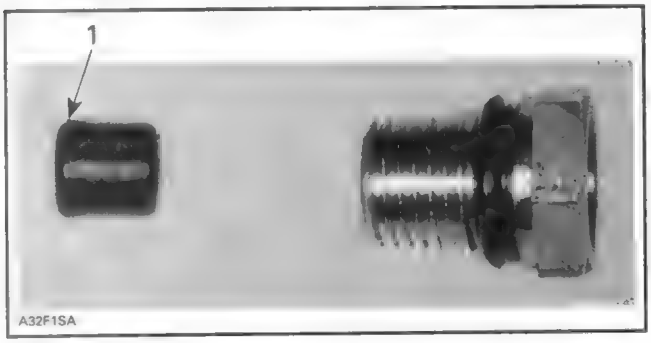
Install the gas fill tool kit (P/N 503 190 102) on gas shock valve tool (tire valve type) (P/N 529 035 570). Set the regulator pressure on the nitrogen cylinder as per the shock requirement.

Mount the shock on vise. Remove screw on top of valve. Place the needle guide of gas refill tool on the shock valve. While depressing the detent pin of the gas refill tool and pushing forward the needle assembly, insert the needle through the rubber core of the pressure valve assembly of the shock.



NOTE: For replacement of the needle or filling the shock, carefully follow the instructions provided with the gas fill tool kit (P/N 503 190 102).

On some models, rubber may pop out of needle valve when inserting tool needle. If so, remove valve core and rubber then, reinstall rubber with its larger diameter last.



1. Larger diameter

Carefully inspect damper for gas or oil leaks. Any leaks must be corrected before continuing. If no leak is detected, install the screw on top of the valve and clean the shock with the pulley flange cleaner (P/N 413 711 809).

Damper gas pressure cannot be confirmed by using a pressure gauge. The volume of gas in the shock is very small, and the amount lost during gauge installation will lower the pressure too much and require refilling.

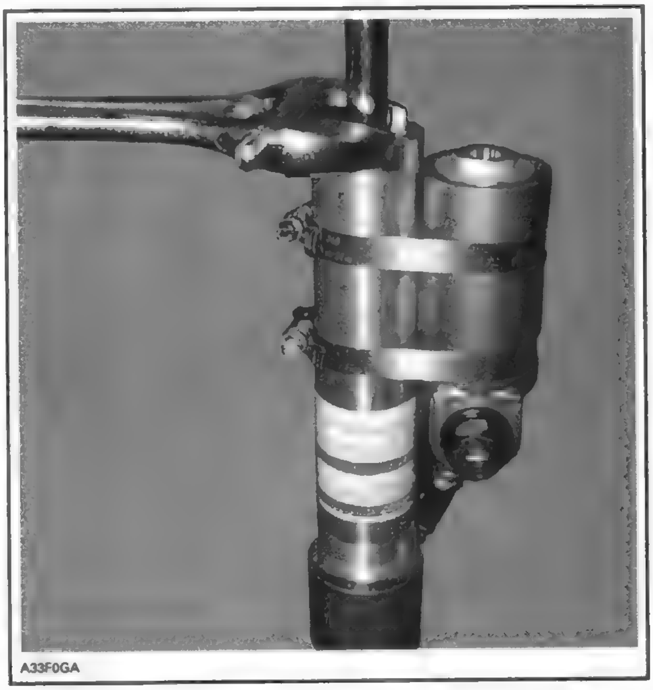
After recharging is complete the rebuilt shock should be bench-tested. Stroke the shock to ensure full travel and smooth compression and rebound action. If the shaft moves in or out erratically this could indicate too much air is trapped inside. If the shaft will not move or has partial travel then it may be hydraulically locked. In either event the shock must be rebuilt again. Pay particular attention to the placement of the IFP, quantity of oil and shim stack/piston assembly.

HPG T/A Racing Clicker Rebuild Procedure

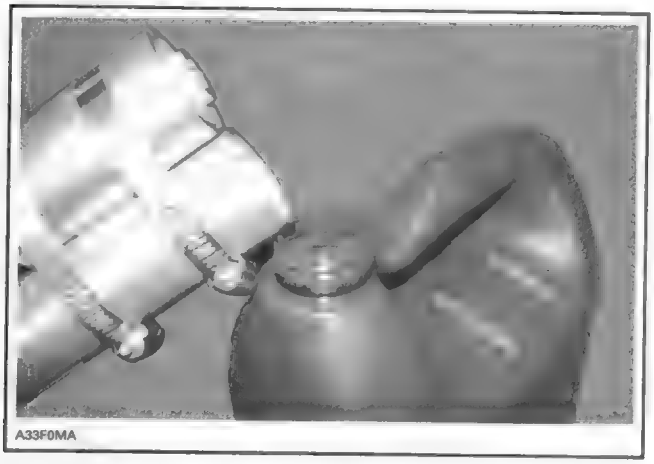
Tightly secure the shock base in vise. DO NOT CLAMP ONTO SHOCK BODY.

Using a 12 mm wrench, slowly remove air inlet valve, allowing the gas inside the reservoir to escape.

Remove top shock cover using a 36 mm wrench. Pull shock rod out of main shock body.

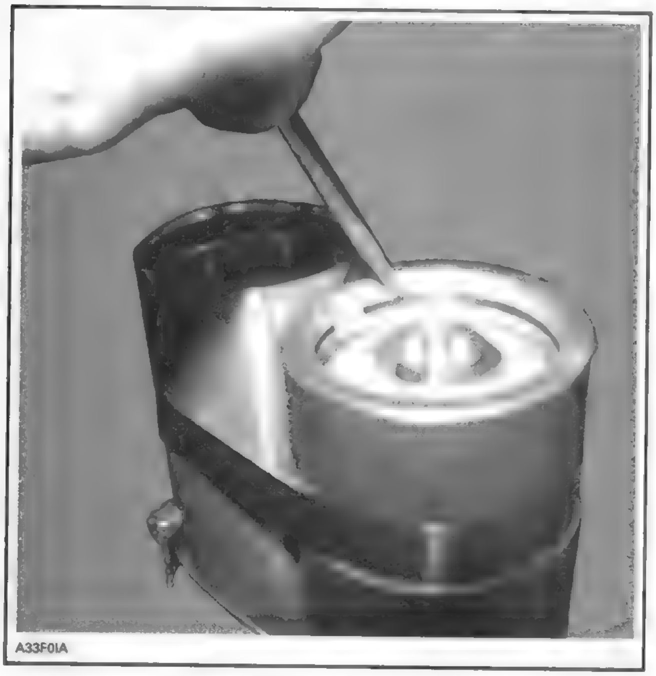


Drain oil from the shock body. Dispose of used oil properly.



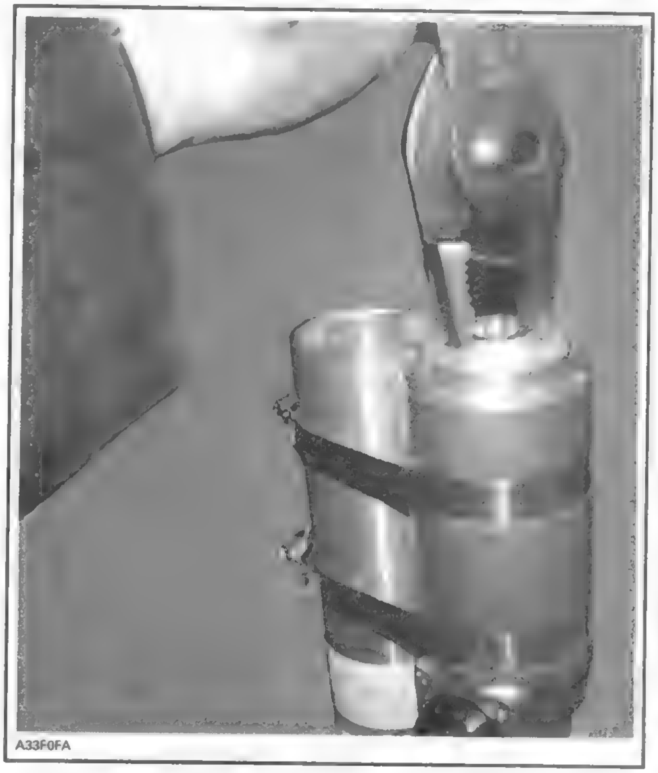
A33F0MA

Push down the remote reservoir cover to remove the retaining circlip.



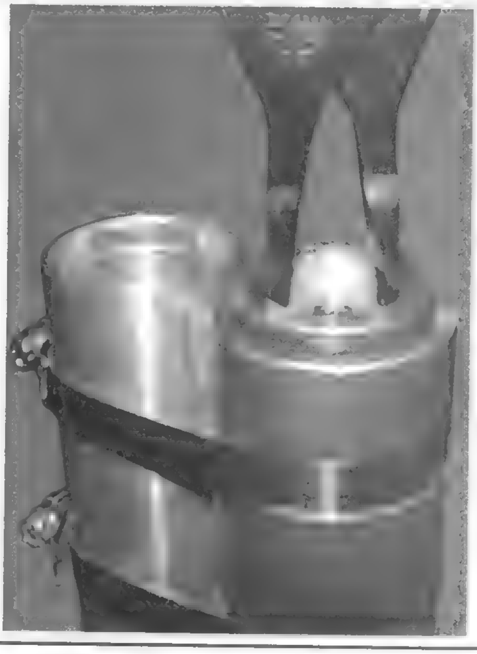
A33F0IA

Remove the remote reservoir cover.



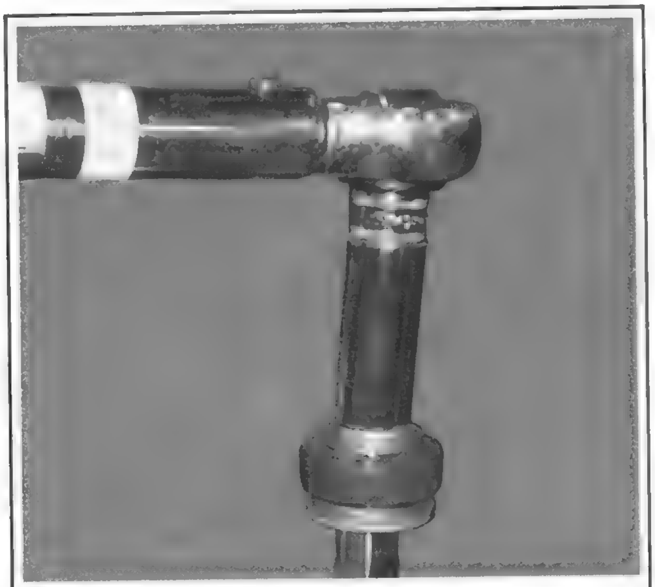
A33F0FA

Remove the floating piston inside the remote reservoir.



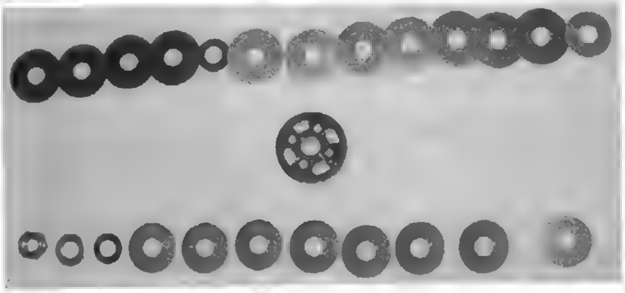
A33F0JA

Remove the lock nut using a 14 mm wrench securing shims, washers and piston to rod.



A33F0SA

Carefully remove and layout shims, washers and piston from rod. Play close attention to shims and washers sequence and piston position.



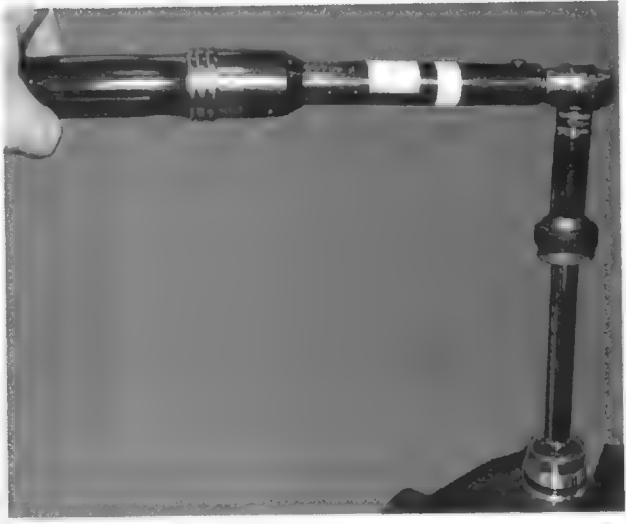
A33F0NA

TYPICAL

Clean all shock components using pulley flange cleaner (P/N 413 711 809). DO NOT MIX SHIMS AND WASHERS TOGETHER.

Assemble valve shims, washers and piston in proper order and place them back onto shock rod.

Torque the rod nut at 18 N•m (159 lbf•**in**).



A33F0LA

Fill main shock body with shock absorber oil to a level of half full.

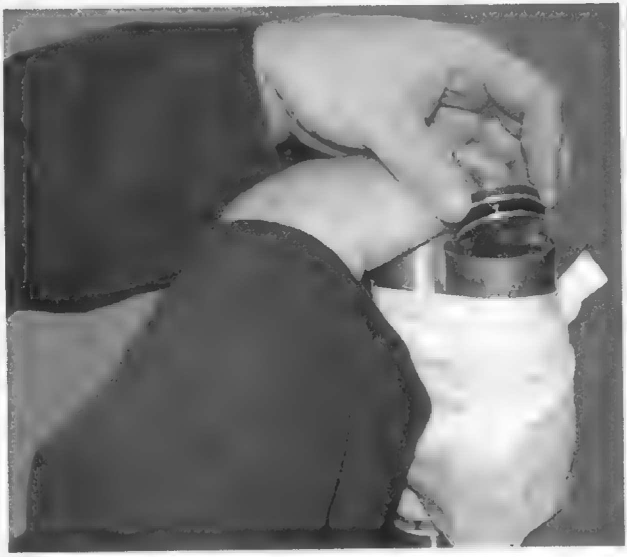
Fill also remote reservoir with shock absorber oil to within 6.4 mm (1/4 in) from the top.

Hold the remote reservoir in a way so the oil level in the shock and the remote reservoir are at the same height.

Cup your hand and place it over the remote reservoir. Pump with your hand to circulate oil through the shock and reservoir to remove any trapped air. Low speed adjuster must be open 1 turn minimum.

Fill the remote reservoir with shock absorber oil.

Lubricate the O-ring on floating piston with shock oil and install it.



A33F0KA

NOTE: The key to good shock performance is to remove all the air from shock body and reservoir.

Push the floating piston to the bottom of the remote reservoir. Oil will rise in the main shock body almost to the top.

Fill the shock body with shock absorber oil (P/N 293 600 035) until level with bottom of threads.

Lubricate seal around piston and valve stack and gently push into main shock body.

Stroke the piston and valve stack slowly to remove any trapped air. Using a small hammer or wrench, gently tap on the rod mounting eyelet to help remove air.

Again, push the floating piston to the bottom of the remote reservoir.

Pull shock rod as far out as possible and replace the shock cover and torque to 65 N•m (48 lbf•ft). Oil must spill from the shock body before the seal cover O-ring seals the shock.

Lubricate the O-ring on floating piston with shock oil and install the remote reservoir cover.

Push down the cover and install the retaining circlip.

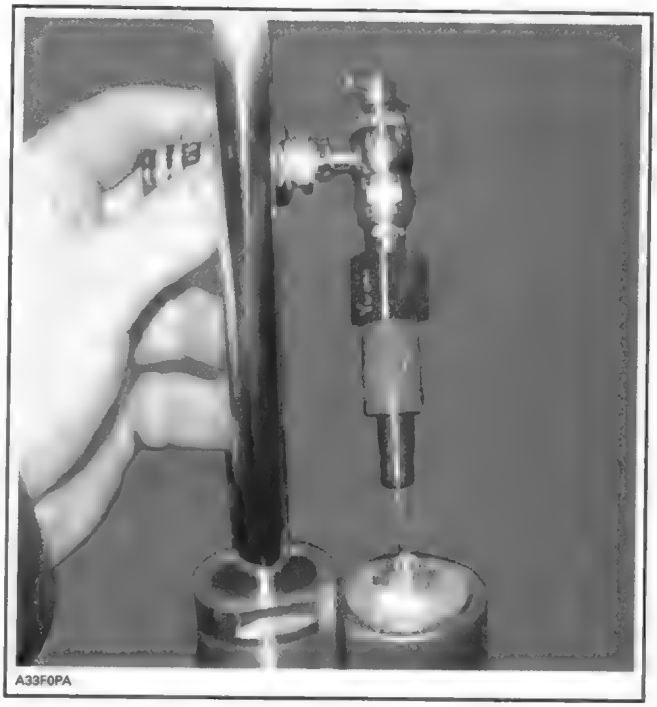
Pull the cover to seat it against the retaining circlip.

⚠ WARNING

Make sure the cover is firmly seated against the retaining circlip before filling with gas.

Install the air inlet valve.

Pressurize the shock at 2070 kPa (300 PSI) with nitrogen (N). Use the correct gas fill tool kit (P/N 503 190 102).



A33F0PA

Carefully inspect damper for gas or oil leaks. Any leaks must be corrected before continuing. If no leak is detected, install the safety screw into the air inlet valve and clean the shock with the pulley flange cleaner (P/N 413 711 809).

After recharging is complete, the rebuilt shock should be bench-tested. Stroke the shock to ensure full travel, smooth compression and rebound action. If the damper rod moves in or out erratically this could indicate air is trapped inside. If the damper rod will not move or has partial travel then it may be hydraulically locked. In either event the shock must be taken apart.

Calibration Charts

MX Z RENEGADE X (CA/US)

	BRP P/N	INSTALLATION DISTANCE OF FLOATING PISTON (IFP)	COMPRESSION	REBOUND	SLIT	PRESSURE
FRONT SUSPENSION						
FRONT	505 072 262 (Kayaba shock)	164 mm (6-15/32 in)	1 x 30 x .203 1 x 14 x .152 4 x 30 x .152 1 x 28 x .114 1 x 16 x .152	3 x 26 x .203 1 x 15 x .254	No slit	2070 kPa (300 PSI)
REAR SUSPENSION						
FRONT	503 191 797 (C-36 Kayaba shock)	119.5 mm (4-45/64 in)	2 x 30 x .203 1 x 17 x .152 10 x 30 x .152 1 x 26 x .114 1 x 22 x .114	1 x 26 x .203 1 x 15 x .114 3 x 26 x .254 1 x 16 x .203	1	2070 kPa (300 PSI)
REAR	503 191 585 (C-36 Kayaba shock)	54.5 mm (2-9/64 in)	2 x 30 x .203 1 x 17 x .152 6 x 30 x .203 1 x 28 x .114 1 x 20 x .114	1 x 26 x .254 1 x 17 x .114 6 x 26 x .254 1 x 17 x .203	1	2070 kPa (300 PSI)

MX Z RENEGADE X (EUR)

	BRP P/N	INSTALLATION DISTANCE OF FLOATING PISTON (IFP)	COMPRESSION	REBOUND	SLIT	PRESSURE
FRONT SUSPENSION						
FRONT	505 072 381 (Kayaba shock)	160 mm (6-19/64 in)	1 x 30 x .203 1 x 14 x .152 4 x 30 x .152 1 x 28 x .114 1 x 16 x .152	1 x 26 x .203 1 x 15 x .114 4 x 26 x .152 1 x 16 x .254	No slit	2070 kPa (300 PSI)
REAR SUSPENSION						
FRONT	503 191 812 (C-36 Kayaba shock)	119.5 mm (4-45/64 in)	1 x 30 x .203 1 x 18 x .114 5 x 30 x .203 1 x 26 x .114 1 x 20 x .114	1 x 26 x .254 1 x 18 x .114 5 x 26 x .254 1 x 20 x .203	1	2070 kPa (300 PSI)
REAR	503 191 816 (C-36 Kayaba shock)	54.5 mm (2-9/64 in)	3 x 30 x .203 1 x 18 x .152 6 x 30 x .203 1 x 24 x .114 1 x 20 x .114	2 x 26 x .203 1 x 20 x .114 5 x 26 x .203 1 x 17 x .254	1	2070 kPa (300 PSI)

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MX Z TNT (CA/US)						
	BRP P/N	**INSTALLATION DISTANCE OF FLOATING PISTON (IFP)**	**COMPRESSION**	**REBOUND**	**SLIT**	**PRESSURE**
FRONT SUSPENSION						
FRONT	505 071 991 (Kayaba shock)	167 mm (6-37/64 in)	1 x 30 x .203 1 x 14 x .152 4 x 30 x .152 1 x 28 x .114 1 x 16 x .152	1 x 26 x .203 1 x 15 x .114 4 x 26 x .152 1 x 16 x .254	1	2070 kPa (300 PSI)
REAR SUSPENSION						
FRONT	503 191 791 (C-36 Kayaba shock)	119.5 mm (4-45/64 in)	2 x 30 x .203 1 x 14 x .152 6 x 30 x .152 1 x 26 x .114 1 x 18 x .114	1 x 26 x .203 1 x 15 x .114 3 x 26 x .254 1 x 16 x .203	1	2070 kPa (300 PSI)
REAR	503 191 801 (C-36 Kayaba shock)	171.5 mm (6-3/4 in)	2 x 30 x .203 1 x 14 x .152 6 x 30 x .203 1 x 28 x .114 1 x 18 x .114	1 x 26 x .254 1 x 16 x .114 6 x 26 x .254 1 x 16 x .203	1	2070 kPa (300 PSI)

MX Z TNT (EUR)						
	BRP P/N	**INSTALLATION DISTANCE OF FLOATING PISTON (IFP)**	**COMPRESSION**	**REBOUND**	**SLIT**	**PRESSURE**
FRONT SUSPENSION						
FRONT	505 072 381 (Kayaba shock)	160 mm (6-19/64 in)	1 x 30 x .203 1 x 14 x .152 4 x 30 x .152 1 x 28 x .114 1 x 16 x .152	1 x 26 x .203 1 x 15 x .114 4 x 26 x .152 1 x 16 x .254	No slit	2070 kPa (300 PSI)
REAR SUSPENSION						
FRONT	503 191 812 (C-36 Kayaba shock)	119.5 mm (4-45/64 in)	1 x 30 x .203 1 x 18 x .114 5 x 30 x .203 1 x 26 x .114 1 x 20 x .114	1 x 26 x .254 1 x 18 x .114 5 x 26 x .254 1 x 20 x .203	1	2070 kPa (300 PSI)
REAR	503 191 814 (C-36 Kayaba shock)	54.5 mm (2-9/64 in)	3 x 30 x .203 1 x 18 x .114 6 x 30 x .203 1 x 24 x .114 1 x 20 x .114	2 x 26 x .203 1 x 20 x .114 5 x 26 x .203 1 x 17 x .254	1	2070 kPa (300 PSI)

MX Z X (CA/US)

	BRP P/N	INSTALLATION DISTANCE OF FLOATING PISTON (IFP)	COMPRESSION	REBOUND	SLIT	PRESSURE
FRONT SUSPENSION						
FRONT	505 072 262 (Kayaba shock)	164 mm (6-15/32 in)	1 x 30 x .203 1 x 14 x .152 4 x 30 x .152 1 x 28 x .114 1 x 16 x .152	3 x 26 x .203 1 x 15 x .254	No slit	2070 kPa (300 PSI)
REAR SUSPENSION						
FRONT	503 191 791 (C-36 Kayaba shock)	119.5 mm (4-45/64 in)	2 x 30 x .203 1 x 14 x .152 6 x 30 x .152 1 x 26 x .114 1 x 18 x .114	1 x 26 x .203 1 x 15 x .114 3 x 26 x .254 1 x 16 x .203	1	2070 kPa (300 PSI)
REAR	503 191 586 (C-36 Kayaba shock)	54.5 mm (2-9/64 in	1 x 30 x .203 1 x 15 x .152 3 x 30 x .203 1 x 26 x .114 1 x 18 x .114	1 x 26 x .254 1 x 16 x .114 6 x 26 x .254 1 x 17 x .203	1	2070 kPa (300 PSI)

MX Z X (EUR)

	BRP P/N	INSTALLATION DISTANCE OF FLOATING PISTON (IFP)	COMPRESSION	REBOUND	SLIT	PRESSURE
FRONT SUSPENSION						
FRONT	505 072 381 (Kayaba shock)	160 mm (6-19/64 in)	1 x 30 x .203 1 x 14 x .152 4 x 30 x .152 1 x 28 x .114 1 x 16 x .152	1 x 26 x .203 1 x 15 x .114 4 x 26 x .152 1 x 16 x .254	No slit	2070 kPa (300 PSI)
REAR SUSPENSION						
FRONT	503 191 812 (C-36 Kayaba shock)	119.5 mm (4-45/64 in)	1 x 30 x .203 1 x 18 x .114 5 x 30 x .203 1 x 26 x .114 1 x 20 x .114	1 x 26 x .254 1 x 18 x .114 5 x 26 x .254 1 x 20 x .203	1	2070 kPa (300 PSI)
REAR	503 191 814 (C-36 Kayaba shock)	54.5 mm (2-9/64 in)	3 x 30 x .203 1 x 18 x .114 6 x 30 x .203 1 x 24 x .114 1 x 20 x .114	2 x 26 x .203 1 x 20 x .114 5 x 26 x .203 1 x 17 x .254	1	2070 kPa (300 PSI)

SUMMIT X						
	BRP P/N	**INSTALLATION DISTANCE OF FLOATING PISTON (IFP)**	**COMPRESSION**	**REBOUND**	**SLIT**	**PRESSURE**
FRONT SUSPENSION						
FRONT	505 072 232 (Kayaba shock)	167 mm (6-37/64 in)	1 x 30 x .152 1 x 14 x .152 6 x 30 x .152 1 x 16 x .152	1 x 26 x .203 1 x 15 x .114 4 x 26 x .152 1 x 16 x .203	1	2070 kPa (300 PSI)
REAR SUSPENSION						
FRONT	503 191 532 (C-36 Kayaba shock)	119.5 mm (4-45/64 in)	1 x 30 x .203 1 x 14 x .152 5 x 30 x .203 1 x 28 x .114 1 x 24 x .114	1 x 26 x .254 1 x 15 x .114 4 x 26 x .254 1 x 16 x .203	1	2070 kPa (300 PSI)
REAR	503 191 534 (C-36 Kayaba shock)	171.5 mm (6-3/4 in)	1 x 30 x .203 1 x 14 x .152 4 x 30 x .203 1 x 28 x .114 1 x 18 x .114	5 x 26 x .203 1 x 16 x .203	1	2070 kPa (300 PSI)

STEERING SYSTEM

SERVICE TOOLS

Description	Part Number	Page
heated grip installer	529 035 897	477

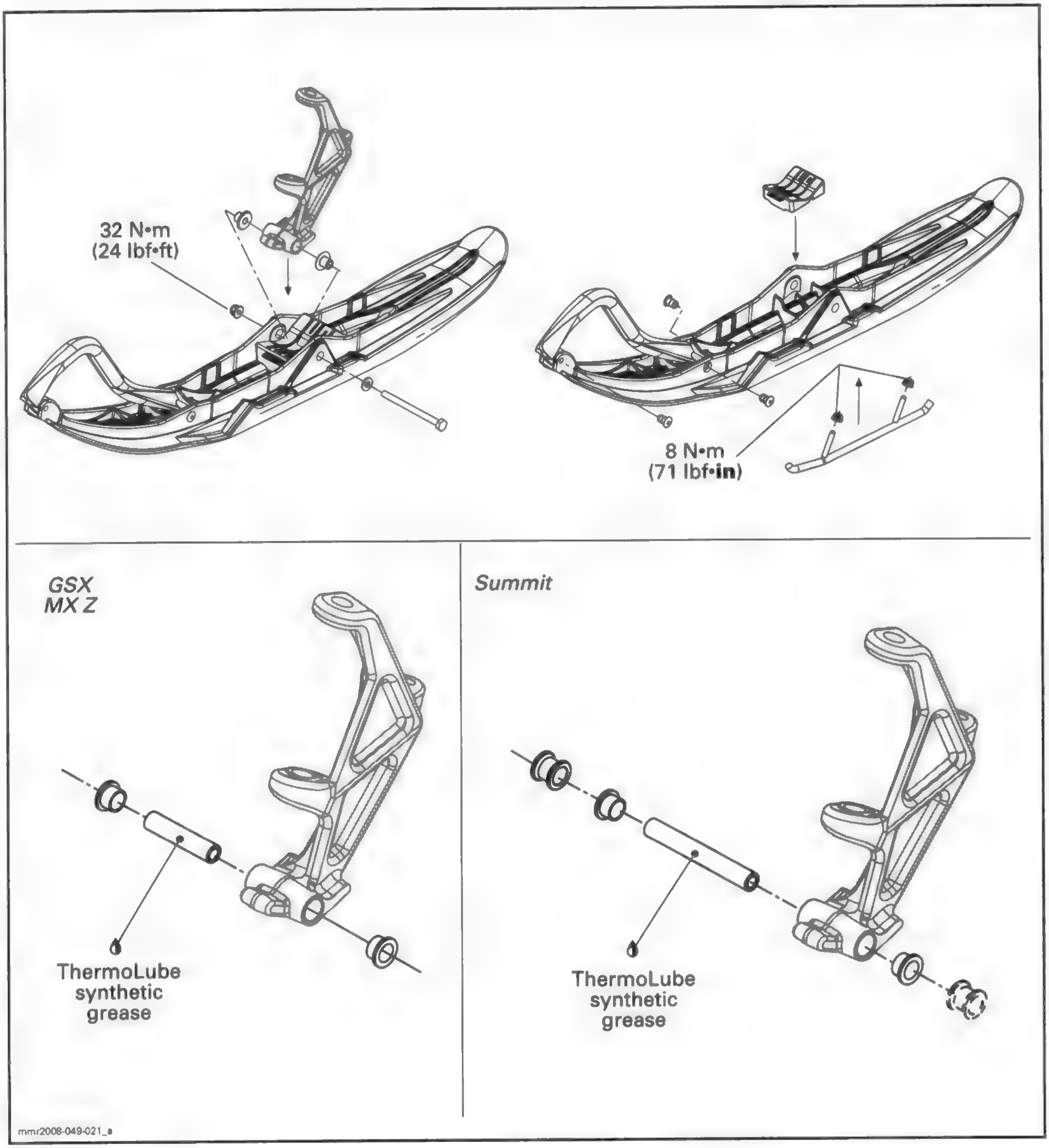
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
multilock-terminal housing extraction tool AMP	755430-2	476–477

SERVICE PRODUCTS

Description	Part Number	Page
ThermoLube synthetic grease	219 700 417	481

SKIS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(24 lbf•ft)
8 N•m
(71 lbf•in)
GSX
MX Z
ThermoLube
synthetic
grease
Summit
ThermoLube
synthetic
grease
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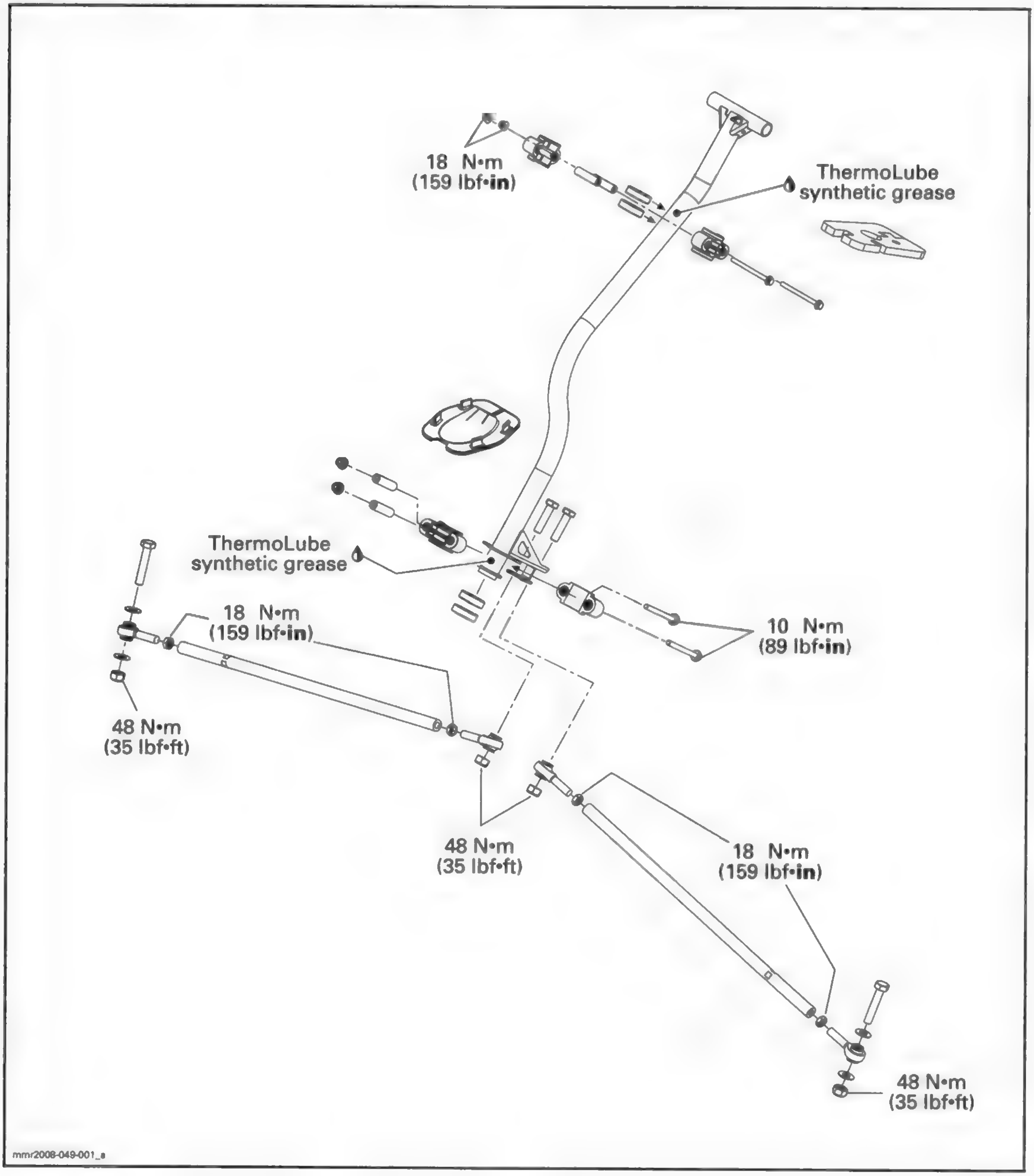
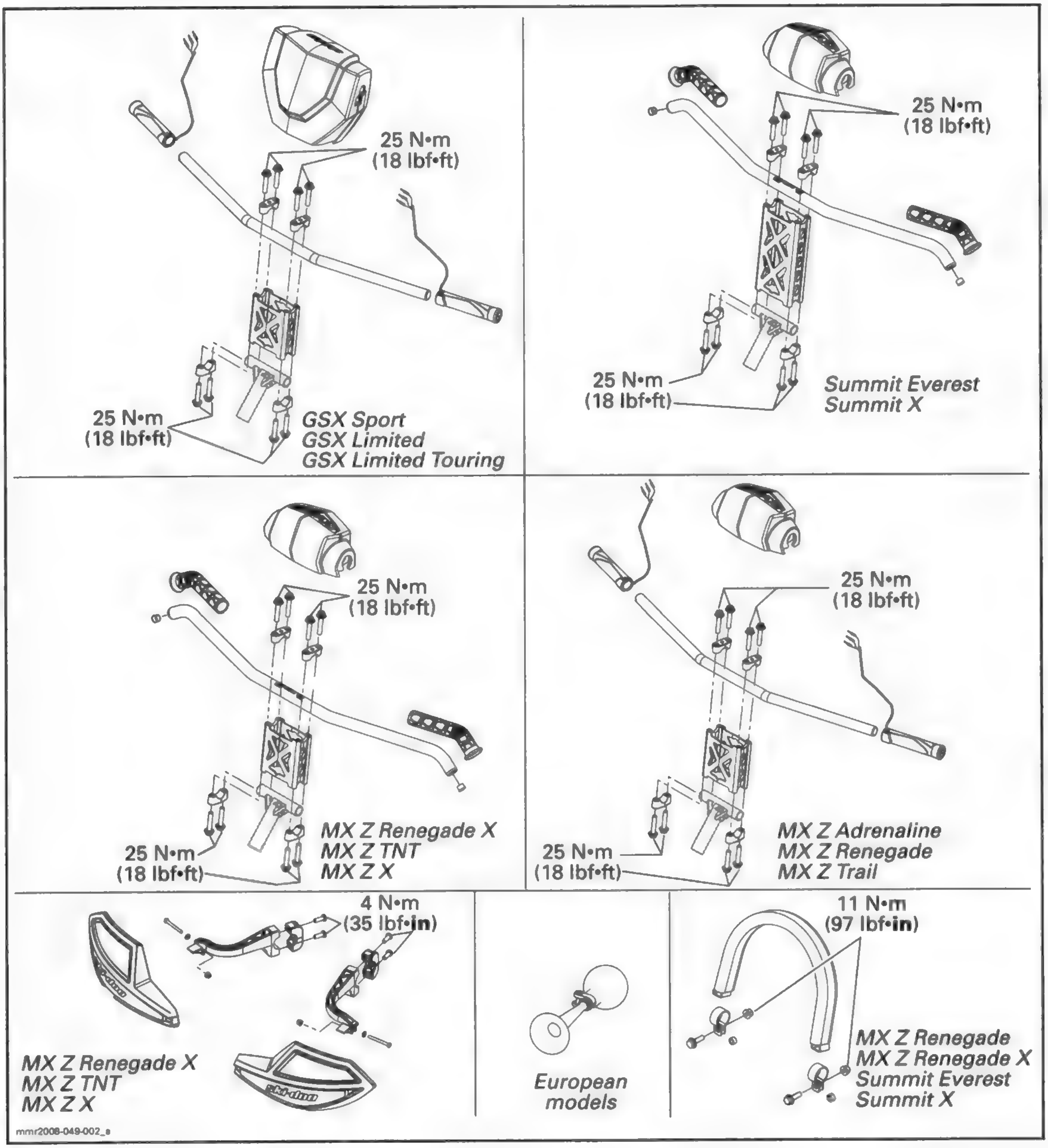
STEERING COLUMN AND TIE-RODS


18 N•m
(159 lbf•in)
ThermoLube
synthetic grease
ThermoLube
synthetic grease
18 N•m
(159 lbf•in)
10 N•m
(89 lbf•in)
48 N•m
(35 lbf•ft)
48 N•m
(35 lbf•ft)
18 N•m
(159 lbf•in)
48 N•m
(35 lbf•ft)
mmr2008-049-001_a

HANDLEBAR


25 N•m
(18 lbf•ft)
25 N•m
(18 lbf•ft)
GSX Sport
GSX Limited
GSX Limited Touring
25 N•m
(18 lbf•ft)
25 N•m
(18 lbf•ft)
Summit Everest
Summit X
25 N•m
(18 lbf•ft)
25 N•m
(18 lbf•ft)
MX Z Renegade X
MX Z TNT
MX Z X
25 N•m
(18 lbf•ft)
25 N•m
(18 lbf•ft)
MX Z Adrenaline
MX Z Renegade
MX Z Trail
4 N•m
(35 lbf•in)
MX Z Renegade X
MX Z TNT
MX Z X
European
models
11 N•m
(97 lbf•in)
MX Z Renegade
MX Z Renegade X
Summit Everest
Summit X
mmr2008-049-002_a

GENERAL

When removing or replacing a part of steering system (except handle grips and handlebar), perform the steering alignment, refer to *STEERING ALIGNMENT* in this section.

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

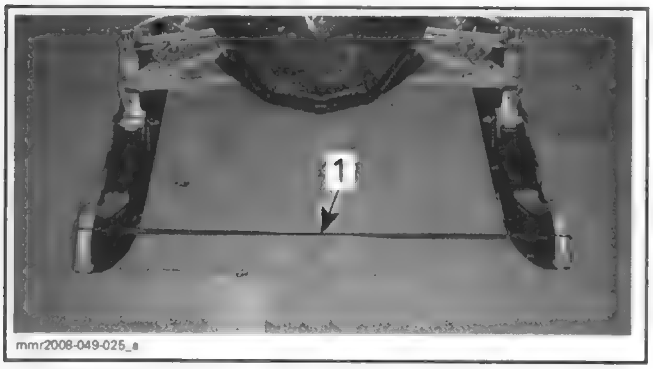
Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pins, etc.) must be replaced with a new ones.

ADJUSTMENT

STEERING ALIGNMENT

Ski alignment is performed by adjusting length of left and right tie-rods. To do this, use the following procedure:

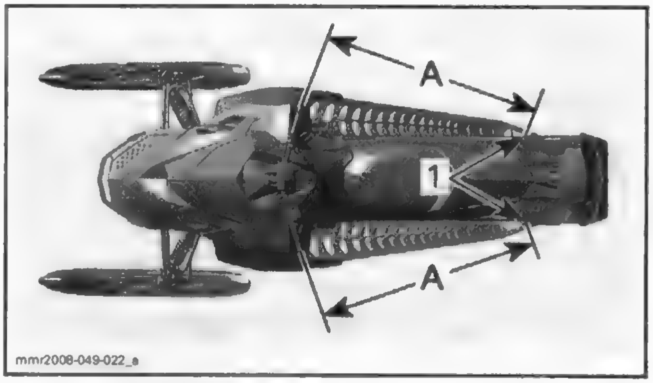
- Leave the vehicle on the ground on its own weight.
- Attach ski handles together with a bungee cord.



1. Bungee cord

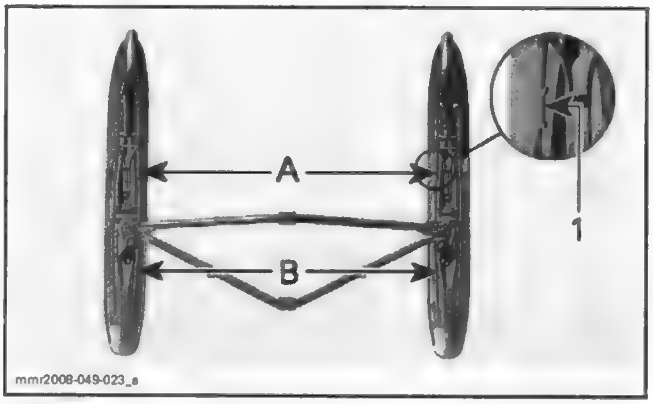
- Position handlebar so that it is straight ahead position by measuring from the extremities of the grips to the rear most edge of the tunnel, as shown.

NOTE: The reference point must be the same to each side.



1. Same reference point
A. Equal distance on each side

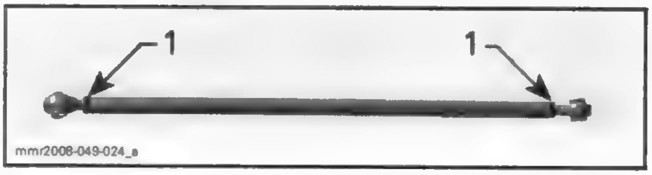
- Verify if skis are in straight-ahead position by placing a straight edge against adjusted track and measuring distance between front and rear ski recesses and straight edge.
- When skis are in straight ahead position, adjust the toe-out.
- Measure the distance between front and rear ski recesses.
- Use the following illustration and this equation to determine the perfect steering adjustment.



1. Recesses
A – B = 5 MM (.197 IN)

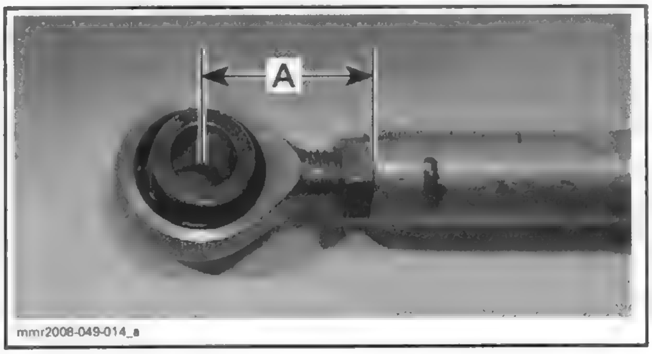
STEERING ALIGNMENT	
Toe-out	5 mm (.197 in)

- If adjustment is needed, loosen tie-rod jam nuts then turn tie-rods to change their length.
- Tighten jam nuts and torque them to 18 N•m (159 lbf•**in**).



1. Jam nut

NOTE: The maximum tie-rod end length not engaged in the tie rod must not exceed 34 mm (1.339 in).



A. 34 mm (1.339 in) maximum

PROCEDURES

SKI RUNNER

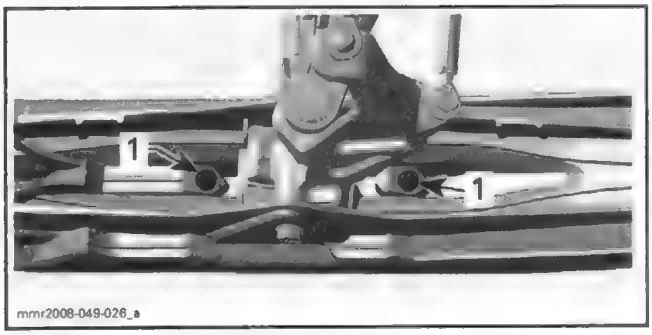
Ski Runner Inspection

Lift the front of vehicle and check ski runners for wear or damages (missing or broken carbide). Replace if necessary.

Ski Runner Removal

Lift the front of vehicle and support it off ground.

Unscrew the ski runner nuts then remove ski runners.



TYPICAL — SKI PILOT 5.7 (LEFT SIDE) SHOWN
1. Ski runner nuts

Ski Runner Installation

The installation is the reverse of the removal procedure. Pay attention to the following.

Torque ski runner nuts to 8 N•m (71 lbf•**in**).

SKI

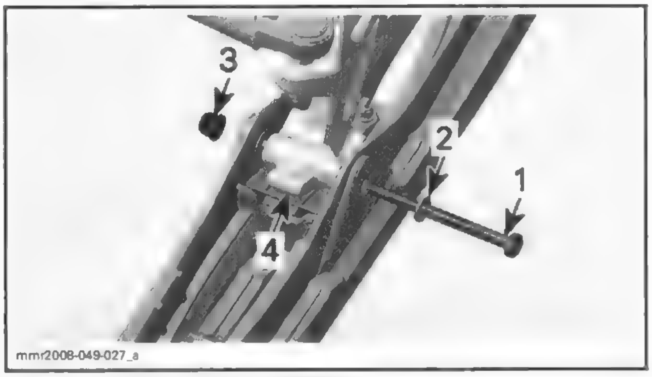
Ski Inspection

Inspect ski for excessive wear or other damage. Replace if necessary.

Ski Removal

Lift front of vehicle and support it off ground.

Unscrew nut then pull ski bolt out.



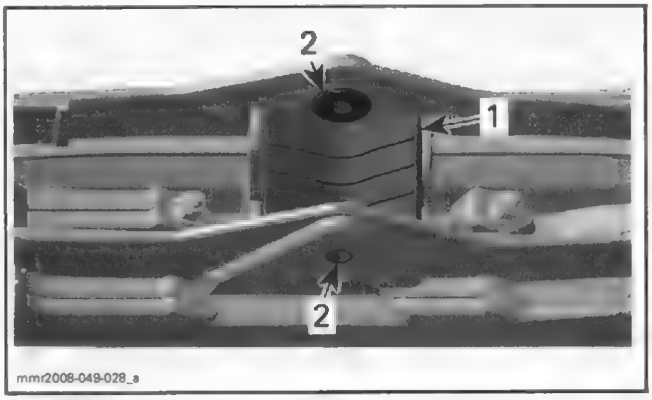
TYPICAL — SKI PILOT 5.7 SHOWN
1. Ski bolt
2. Washer
3. Nut
4. Ski leg

Remove ski from vehicle.

Ski Installation

Make sure bushings are installed in ski holes.

Install the ski stopper. Position indicator in front and make sure the bump in the ski is in the groove of the ski stopper.



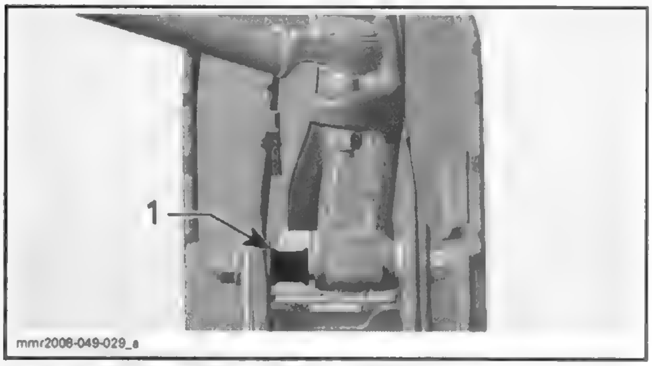
TYPICAL — SKI PILOT 5.7 SHOWN
1. Ski stopper
2. Bushings

SUMMIT Models

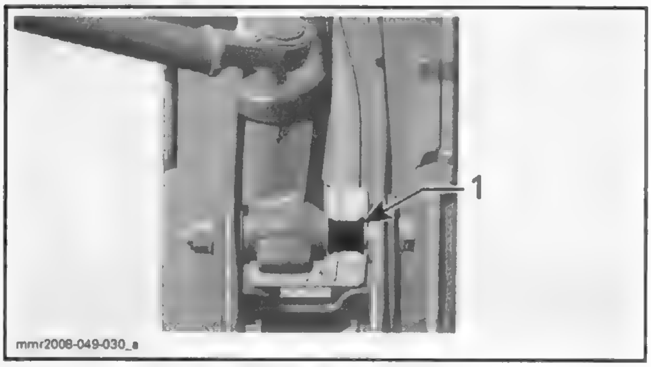
- Determine the desired ski stance (2 positions).
- Install the spacer inside for the narrower stance and outside for the wider stance.

⚠ WARNING

Ensure to place spacer on proper side of ski leg on both skis.



NARROWER STANCE — LEFT SKI SHOWN
1. *Spacer here for the narrower stance*



WIDER STANCE — LEFT SKI SHOWN
1. *Spacer here for the wider stance*

All Models

- Install ski bolt and torque it to 32 N•m (24 lbf•ft).

SKI HANDLE

Ski Handle Removal

Remove ski from vehicle.

Using a 9 mm (3/8 in) drill bit, remove ski handle rivets. Only drill the head of rivet. Do not try to drill all the way through the rivet. Angle the drill bit to reduce the chance of spinning the rivet in the ski.

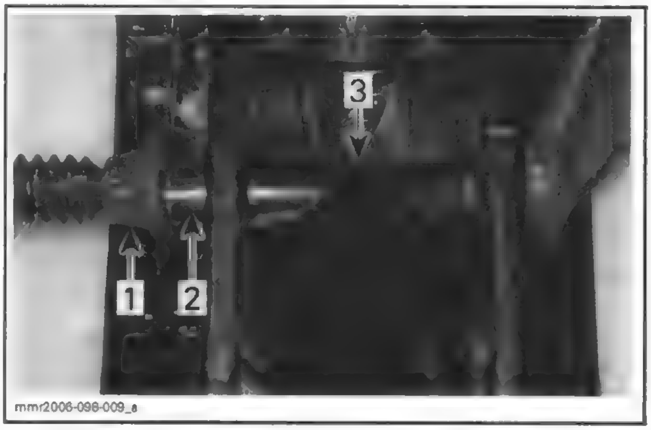
Remove handle from ski.

Place handle in hot water for 10 minutes then using a punch, drive the inner part of rivet out of handle.

Ski Handle Installation

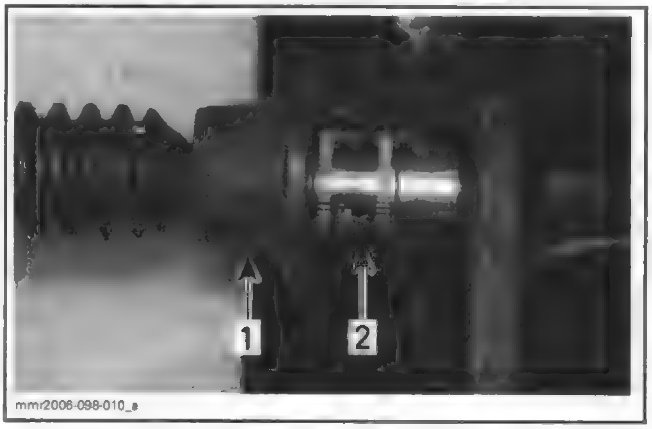
To install rivets, use a C-clamp and a short 10 mm socket.

Place a rivet in position and insert it into ski and ski handle. Repeat the procedure for the other side.



1. *C-clamp*
2. *Rivet*
3. *Handle*

When both rivets are installed, use the short 10 mm socket to push rivet heads against ski.



1. *C-clamp*
2. *10 mm socket*

SKI LEG

To replace a ski leg, refer to *FRONT SUSPENSION* section.

HANDLEBAR GRIP

NOTE: To verify heating elements, refer to *LIGHTS, GAUGE AND ACCESSORIES.*

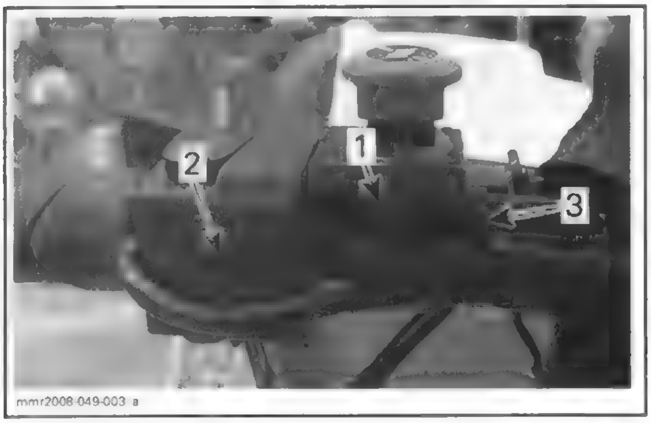
Handlebar Grip Removal

GSX (Limited, Limited Touring, Sport) and MX Z (Adrenaline, Renegade, Trail)

CAUTION: Removing grip from handlebar might damage the heating element. Do not remove needlessly.

Throttle Side:

Loosen engine stop switch and throttle lever.

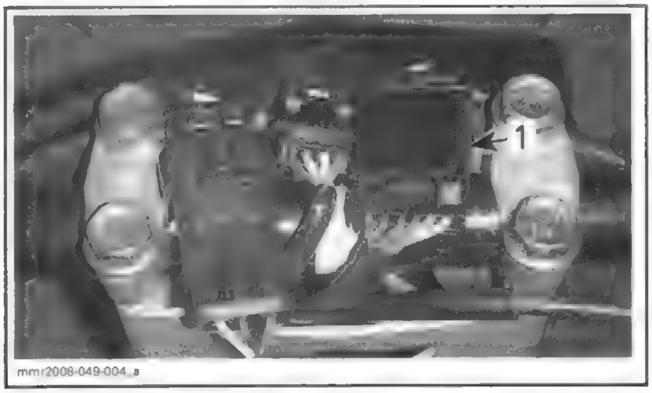

1
2
3
mmr2008-049-003_a

1. *Engine stop switch screw*
2. *Throttle lever screw*
3. *Cut this locking tie*

Move them towards the steering column.

Remove the steering cover.

Unplug the heating element connector.

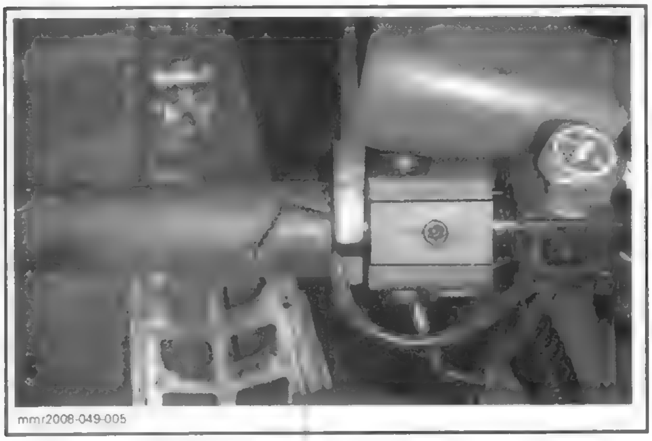

1
mmr2008-049-004_a

GSX LIMITED SHOWN
1. *Heating element connector*

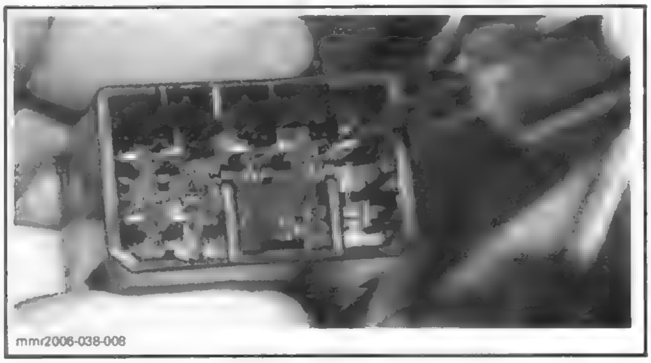
Insert the open side of a 23 mm (7/8 in) wrench against the inner end of grip.

CAUTION: Pay attention not to damage wires with the wrench.

Using a plastic hammer, tap on the side of the wrench end to make the grip slide out.


mmr2008-049-005

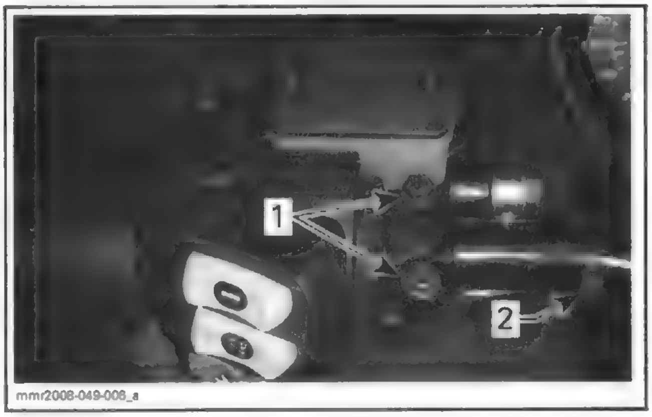
Using a tool such as the multilock-terminal housing extraction tool AMP (P/N 755430-2), push the 3 wires of the grip harness out of connector housing. Note the position of the wires for reinstallation.


mmr2006-038-008

TYPICAL

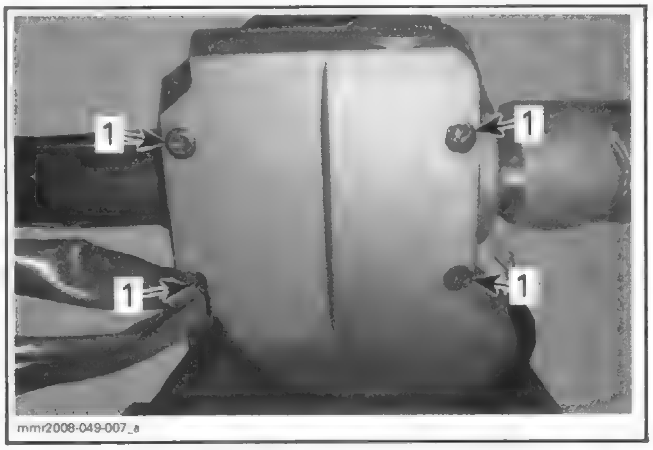
Brake Side:

Unscrew master cylinder from handlebar.


1
2
mmr2008-049-006_a

1. *Master cylinder screws*
2. *Cut this locking tie*

Loosen multifunction switch screws.

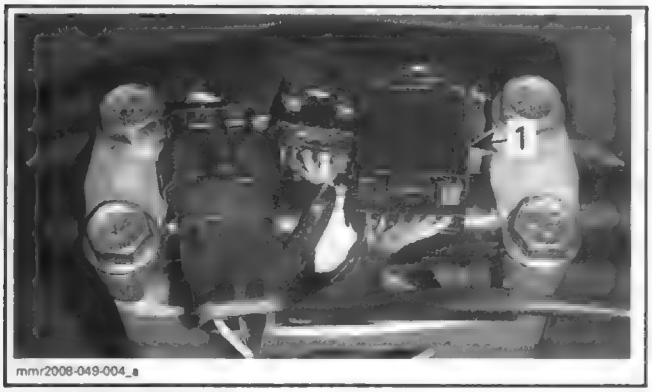

1
1
1
1
mmr2008-049-007_a

1. *Multifunction switch screws*

Move multifunction switch towards the steering column.

Remove the steering cover.

Unplug the heating element connector.



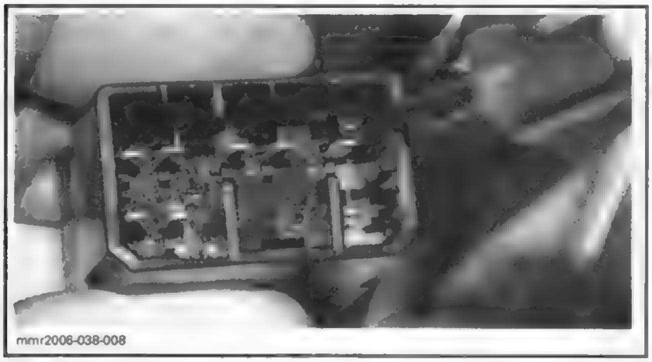
GSX LIMITED SHOWN
1. Heating element connector

Insert the open side of a 23 mm (7/8 in) wrench against the inner end of grip.

CAUTION: Pay attention not to damage wires with the wrench.

Using a plastic hammer, tap on the side of the wrench end to make the grip slide out.

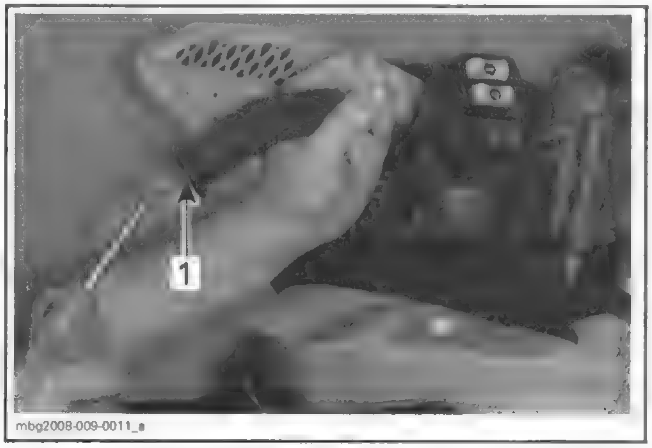
Using a tool such as the multilock-terminal housing extraction tool AMP (P/N 755430-2), push the 3 wires of the grip harness out of connector housing. Note the position of the wires for reinstallation.



TYPICAL

MX Z (Renegade X, TNT, X) and SUMMIT (Everest, X)

Remove grips by pulling while using compressed air, which will inflate or loosen the fit between the grip and handlebar, as shown on picture.



1. Blow air in the grip hole

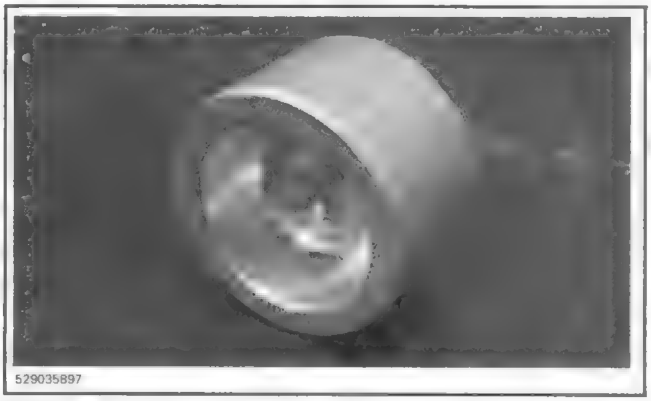
Handlebar Grip Installation

GSX (Limited, Limited Touring, Sport) and MX Z (Adrenaline, Renegade, Trail)

Clean handlebar ends and inside of grip with isopropyl alcohol. Let dry before installation.

CAUTION: Handlebar end and inside of heating grip must be clean and dry before installing heating grip to ensure proper adhesion.

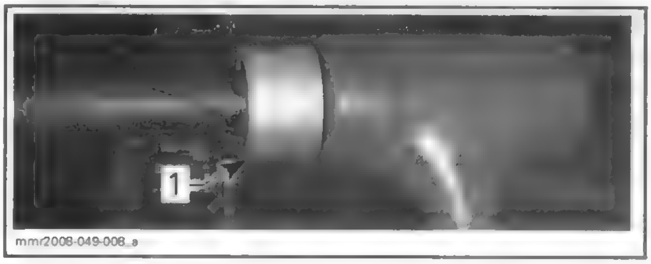
Use the heated grip installer (P/N 529 035 897) to properly install grip.



CAUTION: Installing grip without the insertion tool is likely to damage its heating element.

Position the insertion tool at the outside end of grip.

Using a plastic hammer, tap on tool to push grip on. Continue to tap until grip bottoms.



1. Heated grip installer

Properly route harness at the front of steering.

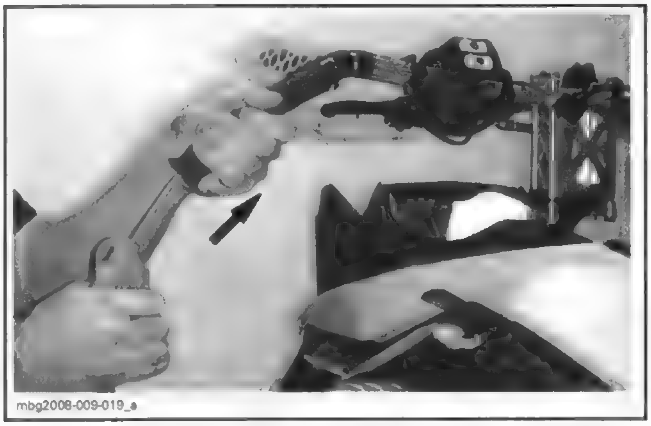
Reinstall terminals and re-plug connectors. Test grips to ensure they heat properly.

NOTE: Note that grips will not work if the engine is at idle speed. Electricity is supplied to grips only if engine is over 2000 RPM.

Install all other removed parts.

MX Z (Renegade X, TNT, X) and SUMMIT (Everest, X)

Install handlebar grips.



NOTE: It may be easier to install grips using compressed air, which will inflate or loosen the fit between the grip and handlebar, as shown on picture.

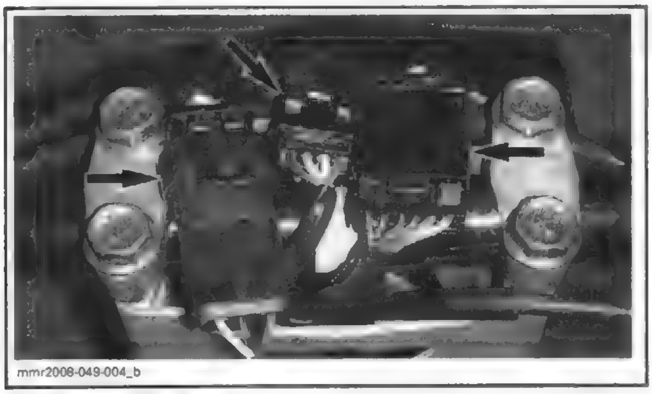
HANDLEBAR

Handlebar Removal

NOTE: If the handlebar must be changed, remove all components (handle grip, throttle lever housing, etc.) before removing it from vehicle.

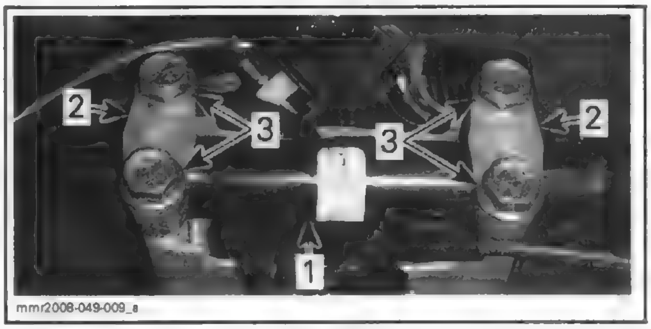
Remove steering cover.

Unplug all connectors.



GSX LIMITED SHOWN

Remove handlebar retaining clamp screws.



1. *Handlebar*
2. *Retaining clamps*
3. *Screws*

Remove handlebar from handlebar extension.

Handlebar Inspection

Inspect the handlebar for:

- Damages
- Cracks
- Bending.

Replace if any of these problems is detected.

⚠ WARNING

Do not try to repair a defective handlebar.

Check handlebar clamps for cracks or distortion, replace if necessary.

Handlebar Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Handlebar Strap

MX Z (Renegade, Renegade X) and SUMMIT (Everest, X)

Ensure to position strap symmetrically each side of handlebar retaining clamps. Tilt strap 5° towards driver relative to handlebar extension.

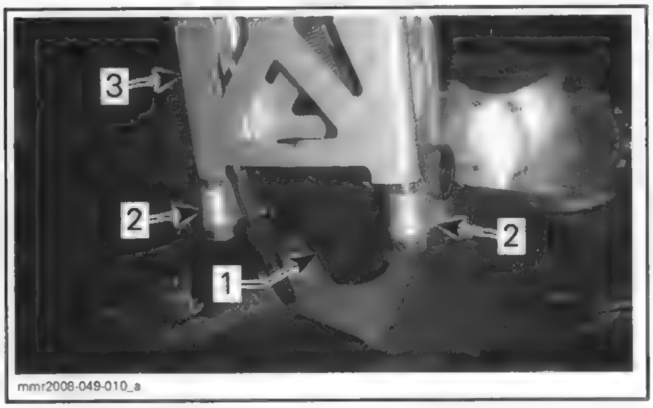
Retaining clip and hardware must be installed in the same position on both strap ends.

HANDLEBAR EXTENSION

Handlebar Extension Removal

Remove *HANDLEBAR* from handlebar extension, see procedure above in this section.

Unscrew bolts retaining the extension to steering column.



SUMMIT X SHOWN
1. *Steering column*
2. *Handlebar extension clamps*
3. *Handlebar extension*

Remove handlebar extension from vehicle.

Handlebar Extension Inspection

Check handlebar extension for:

- Cracks
- Bending
- Other damages.

Replace if any of these problems is detected.

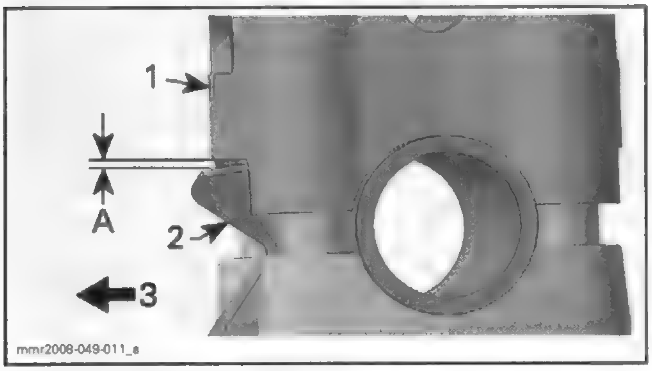
⚠ WARNING

Do not try to repair a defective handlebar extension.

Handlebar Extension Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

When installing handlebar extension, ensure to leave a gap between handlebar extension and stop block on steering column.



1. *Bottom of handlebar extension*
2. *Steering column stop block*
3. *Front of vehicle*

A. *1 mm (.039 in) minimum*

TIE-ROD

NOTE: The same procedure is applied on RH and LH side.

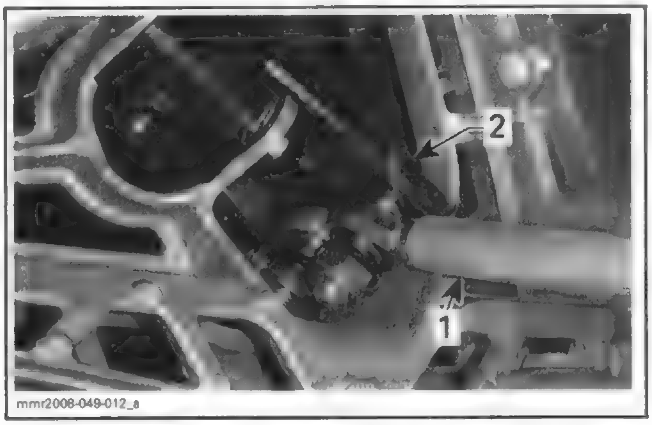
Tie-rod Inspection

Check tie-rod ends for looseness. If play is excessive, replace tie-rod.

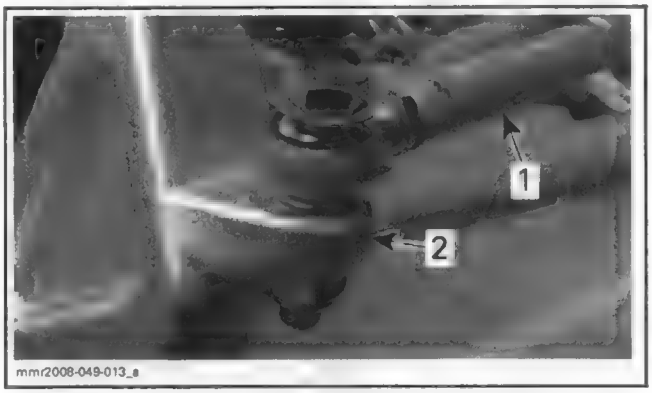
Check if the tie-rod is bend, crack or otherwise damage. Replace if necessary.

Tie-rod Removal

Remove the tie-rod ends from the steering column and ski leg.



1. *Tie-rod*
2. *Steering column*



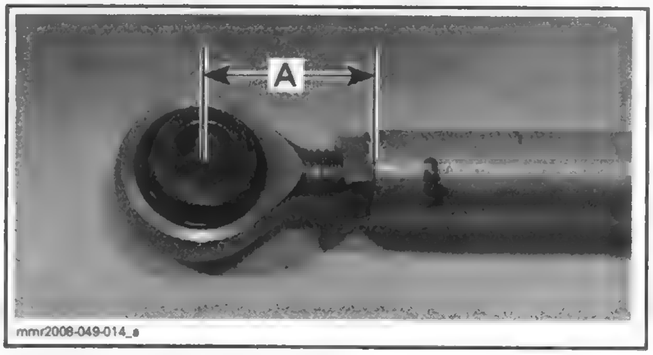
1. *Tie-rod*
2. *Ski leg*

Remove tie-rod from vehicle.

Tie-rod Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

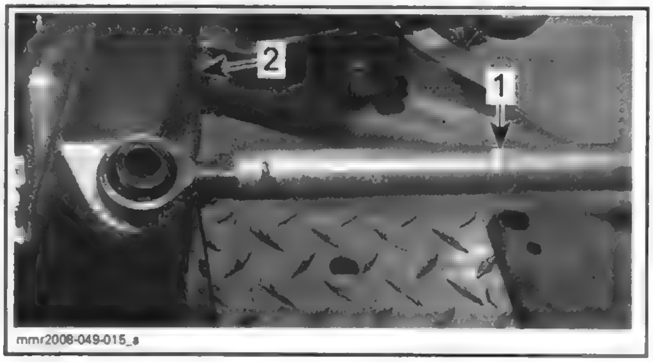
Adjust each tie-rod end length of both tie-rod ends to 30 ± 0.5 mm (1.181 ± .020 in).



A. 30 ± 0.5 mm (1.181 ± .020 in)

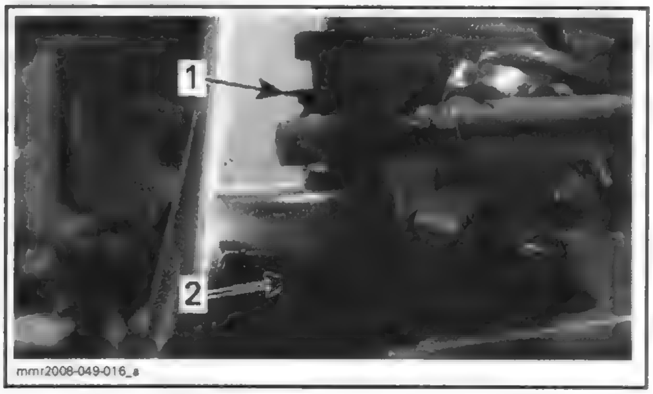
NOTE: The maximum tie-rod end length not engaged in the tie rod must not exceed 34 mm (1.339 in).

Install tie-rod with the groove on ski leg side.



1. *Tie-rod groove*
2. *Ski leg*

On ski leg side, install hardened washers as shown.



1. *Large hardened washer*
2. *Small hardened washer*

Install nuts retaining tie-rod ends. Torque them to 48 N•m (35 lbf•ft).

Perform the steering alignment, refer to *STEERING ALIGNMENT* in this section.

STEERING COLUMN

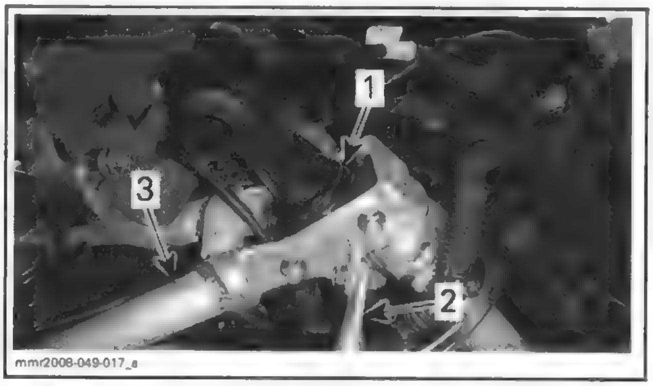
Steering Column Removal

Remove gauge support and console. Refer to *BODY* section.

Remove *HANDLEBAR EXTENSION* from steering column, see procedure in this section.

Remove screws securing steering column upper support.

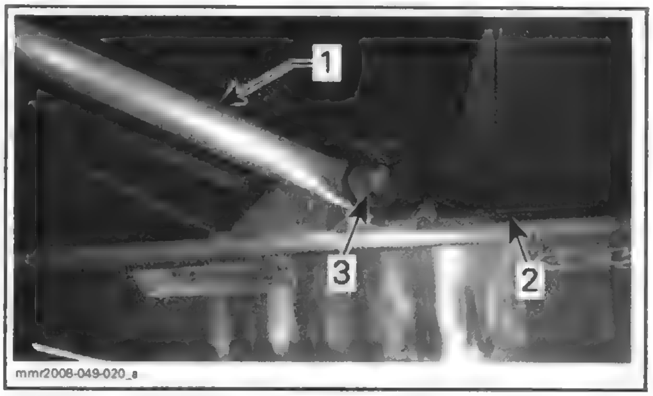
Remove screws securing side frame members to rear frame member.



1. *Steering column support*
2. *RH side frame member*
3. *Rear frame member*

Remove seat.

Unscrew nuts retaining rear frame member and fuel tank to frame.

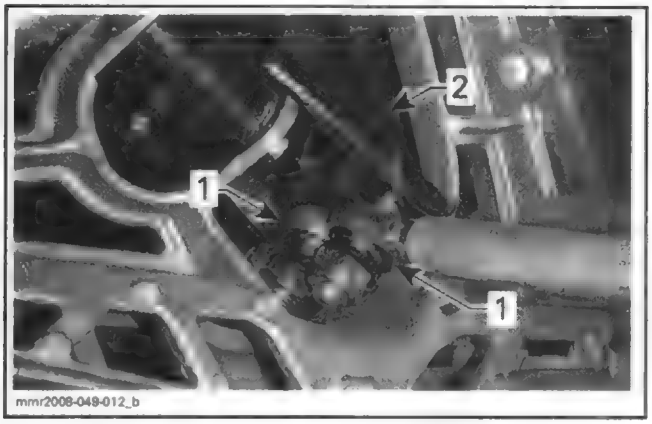


LH SIDE OF VEHICLE SHOWN
1. *Rear frame member*
2. *Fuel tank*
3. *Nut to remove*

Remove the secondary air intake silencer. Refer to *AIR INTAKE SYSTEM* section.

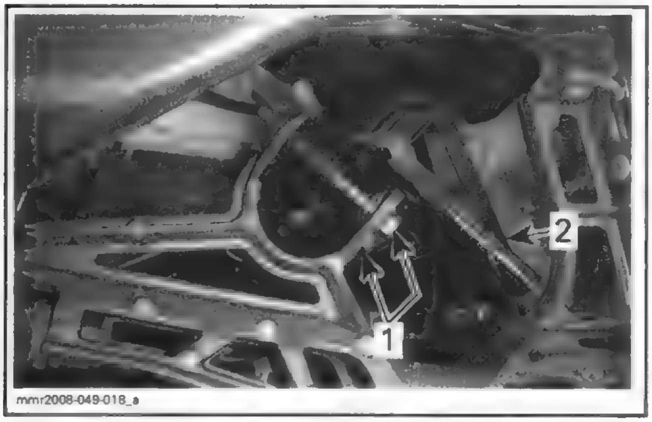
Remove tuned pipe. Refer to *EXHAUST SYSTEM* section.

Remove the tie-rod ends from the steering column.



1. *Tie-rod ends*
2. *Steering column*

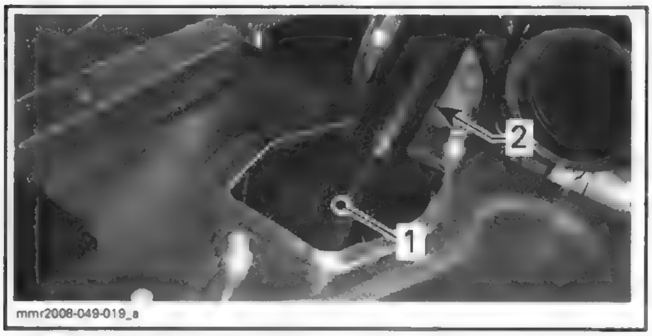
Remove screws securing the steering column lower support.



1. *Steering column support screws*
2. *Steering column*

Remove lower support.

Remove the steering column plate.



1. *Steering column plate*
2. *Steering column*

Pull steering column from top.

Steering Column Inspection

Check if steering column is: cracked, bent, twist or otherwise damaged. Replace steering column if necessary.

⚠ WARNING

Do not try to repair a defective steering column.

Steering Column Installation

The installation is the reverse of the removal procedure.

Apply ThermoLube synthetic grease (P/N 219 700 417) on steering column before installing upper and lower supports.

BODY

SERVICE TOOLS

Description	Part Number	Page
Supertanium™ drill bit	529 031 800	486
adjustment wrench	529 035 891	487

GENERAL

Seat Cleaning

It is recommended to clean the seat with a solution of warm soapy water, using a soft clean cloth.

CAUTION: Avoid use of harsh detergents such as strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc. that may cause damage to the seat cover.

Plastic Cleaning

Clean the vehicle thoroughly, removing all dirt and grease accumulation.

To clean use a soft clean cloth and either soapy water or isopropyl alcohol.

To remove grease, oil or glue use isopropyl alcohol.

CAUTION: Do not apply isopropyl alcohol or acetone directly on decals.

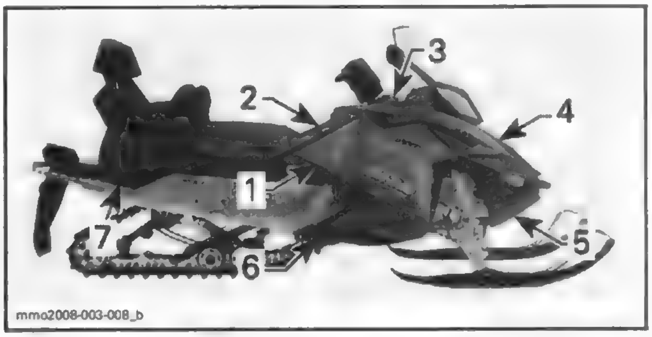
CAUTION: The following products must not be applied on the plastic components used on the vehicles:

- Gasoline
- Brake fluid
- Kerosene
- Diesel fuel
- Lighter fluid
- Varsol
- Naphtha
- Acetone
- Strong detergents
- Abrasive cleaners
- Waxes containing an abrasive or a cleaning agent in their formula.

Apply a non abrasive wax on glossy finish only.

Body Parts Repair

The very first step before repairing plastic materials is to find out exactly which type of material is involved.



PLASTIC PARTS		
	PARTS	MATERIAL
1	Side panel	Polypropylene
2	Console	Surlyn
3	Gauge support	Polypropylene
4	Hood	Surlyn
5	Front bottom pan	Polypropylene
6	Side bottom pan	Polypropylene
7	Trunk	Polypropylene

CAUTION: Some repair products are not compatible with certain plastics.

⚠ WARNING

Polycarbonate windshields must never be repaired by welding or otherwise.

The following company provides a complete line of products to repair plastic materials:

CREST INDUSTRIES, INC.
Trenton, MI 48183
Phone: 734 479-4141
Toll Free: 1 800 822-4100
Fax: 734 479-4040
E-Mail: info@crestauto.com
www.crestauto.com

PROCEDURES

DECAL

Decal Replacement

To remove a decal; heat old decal with a heat gun and peel off slowly.

Using isopropyl alcohol, clean the surface and dry thoroughly.

Apply liquid soap to new decal and carefully position the decal. Using a sponge or a squeegee, remove the air bubbles and surplus water working from the center toward the edges. Allow to air dry.

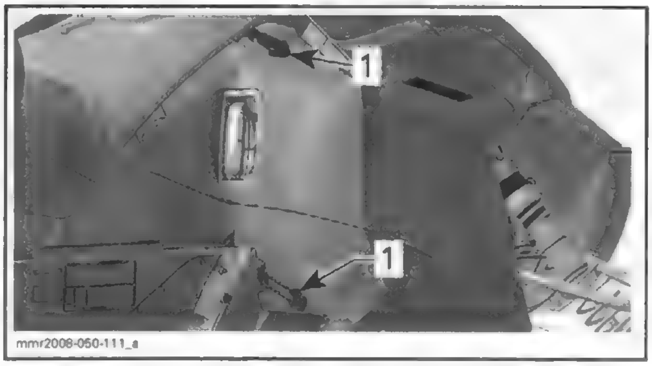
CAUTION: Do not apply isopropyl alcohol or solvent directly on decals. Use only in a well ventilated area.

SIDE PANEL

Side Panel Removal

NOTE: The same procedure applies for RH or LH side.

Stretch and unhook the latches.



1. Latches

Open side panel.

Lift the panel and move the lower hinge out of the slot.

Lower side panel and upper hinge from the slot.

Remove side panel.

Side Panel Installation

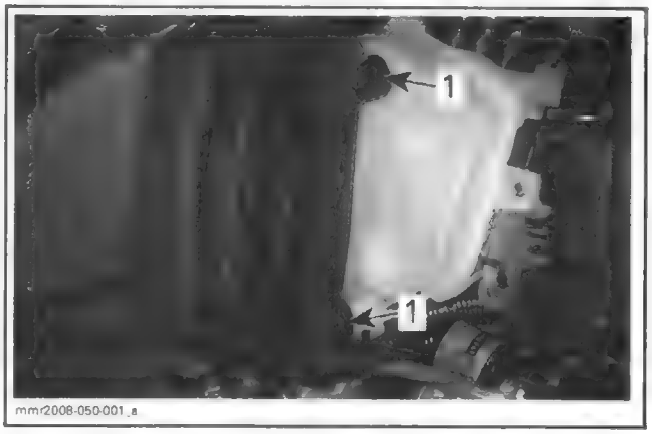
The installation is the reverse of the removal procedure.

REWIND STARTER HANDLE HOUSING

Rewind Starter Handle Housing Removal

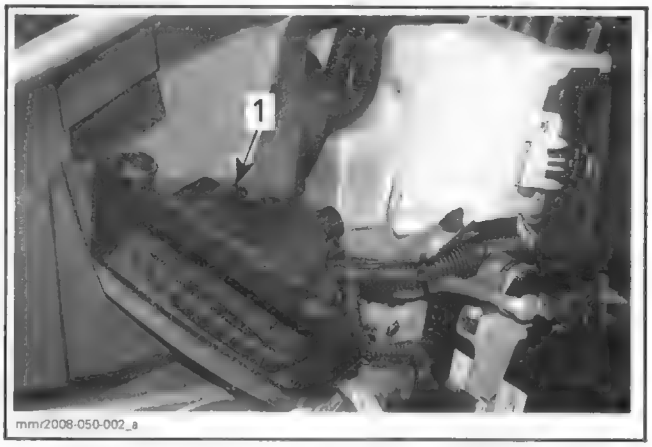
Open RH side panel.

Remove screws retaining housing to oil reservoir.



1. Screws

Pull on housing to release it from oil reservoir.



1. Housing

Remove rewind starter handle. Refer to *REWIND STARTER* section.

Rewind Starter Handle Housing Installation

Installation is the reverse of removal procedure. Pay attention to the following details.

To properly install rewind starter handle housing, it must be pushed vigorously into oil reservoir. Ensure it is properly set in place before installing hardware.

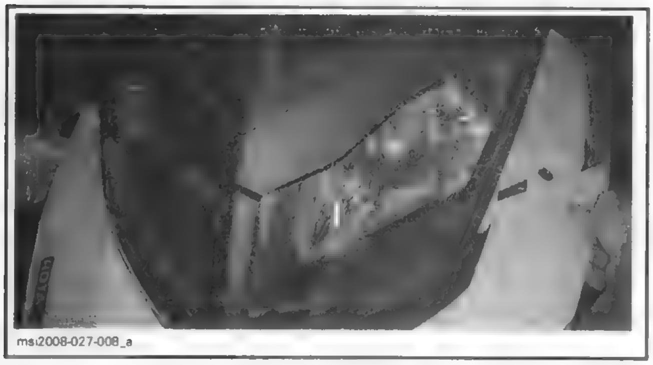
Torque screws to 1 N•m (9 lbf•**in**).

HOOD

Hood Removal

Stand in front of vehicle.

Pull outwards on both sides of hood aft section.



Slide hood forwards.

Remove hood from vehicle.

Hood Installation

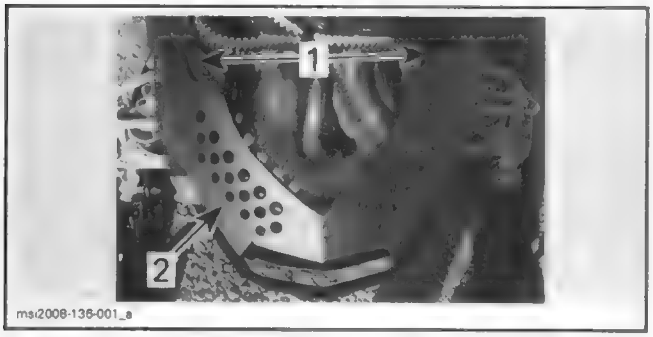
The installation is the reverse of removal procedure.

BOTTOM PAN COVER

Bottom Pan Cover Removal

Remove *HOOD*, see procedure above.

Remove screws that hold bottom pan cover.



1. *Bottom pan cover screws*
2. *Bottom pan cover*

Remove bottom pan cover from vehicle.

Bottom Pan Cover Installation

The installation is the reverse of the removal procedure.

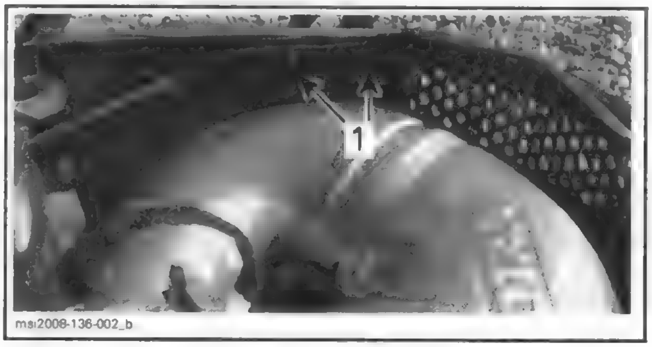
FRONT BUMPER

Front Bumper Removal

Remove *HOOD*, see procedure above.

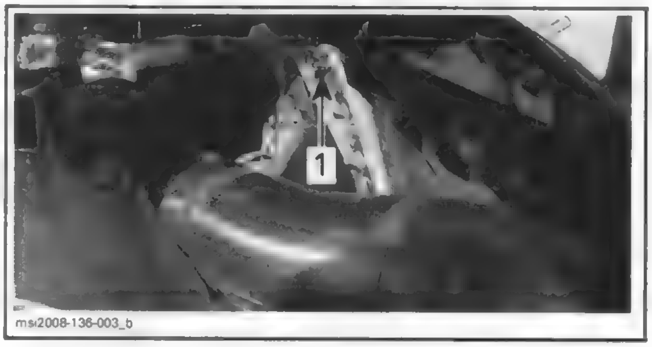
Remove *BOTTOM PAN COVER*, see procedure above.

Remove existing rivets by drilling them.



1. *Front bumper rivets*

Remove front bumper bolts.



1. *Front bumper bolt*

Remove bumper from vehicle by pulling it toward the front.

Front Bumper Installation

Install bumper on vehicle.

Install rivets.

Install bumper bolts and nuts.

Tighten bumper nuts to 10 N•m (89 lbf•**in**).

Install bottom pan cover.

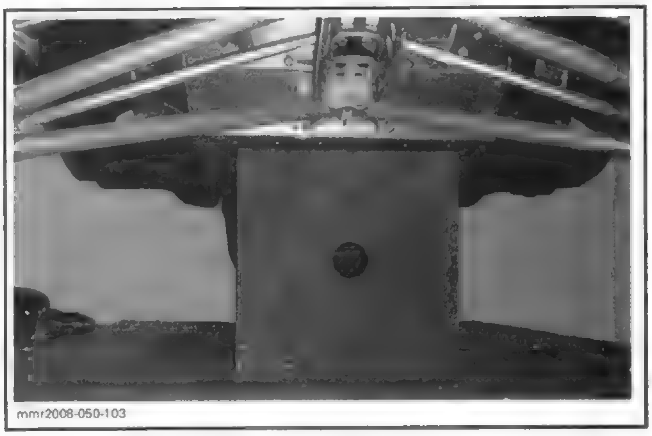
Install hood.

FRONT BOTTOM PAN

Front Bottom Pan Removal

Lift front of vehicle until skis are off the ground.

Place the front portion of frame on a wooden box to support it securely.



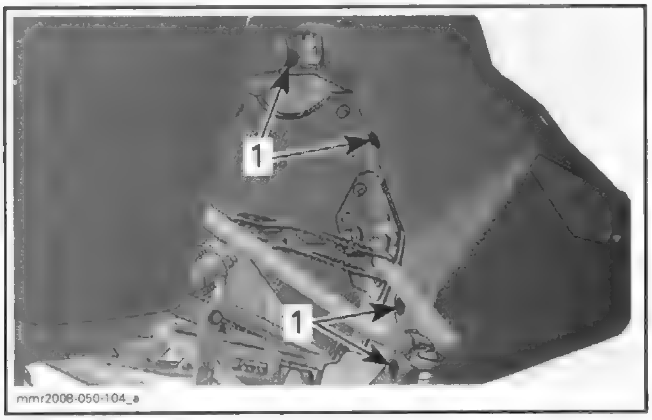
Remove *FRONT BUMPER*, see procedure above.

Remove muffler and tuned pipe. Refer to *EXHAUST SYSTEM* section.

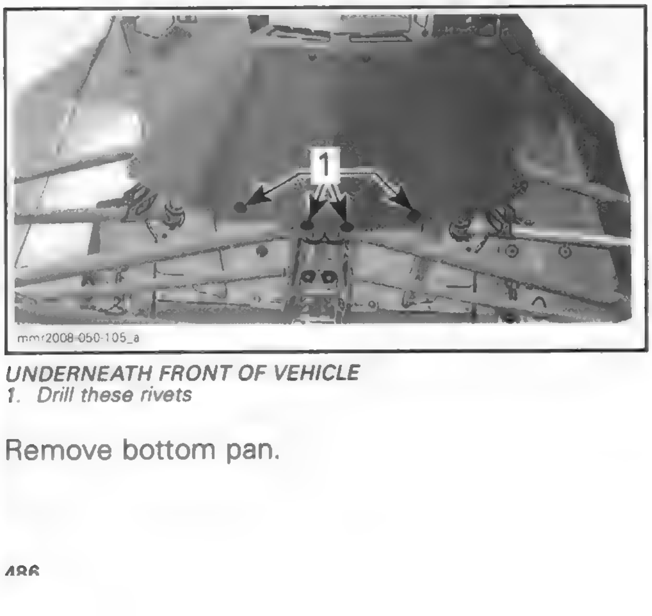
Remove front shock absorbers.

Using an angle drill and a Supertanium™ drill bit (P/N 529 031 800), remove all rivets retaining bottom pan.

NOTE: Refer to *FRAME* for proper procedure when drilling rivets retaining plastic.



RH SIDE SHOWN
1. *Drill these rivets*



UNDERNEATH FRONT OF VEHICLE
1. *Drill these rivets*

Remove bottom pan.

Front Bottom Pan Installation

The installation is the reverse of removal procedure.

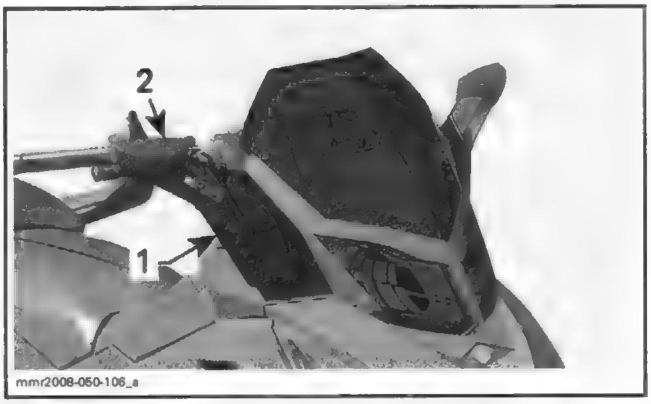
WINDSHIELD

Windshield Removal

Place your hands on each side of windshield.

Pull the windshield until its pins come out of rubber grommets.

NOTE: On **GSX models**, lift both deflectors first.



1. *Windshield deflector*
2. *Mirror*

Windshield Installation

The installation is the reverse of removal procedure.

NOTE: Make sure not to push grommets through gauge support holes.

GAUGE SUPPORT

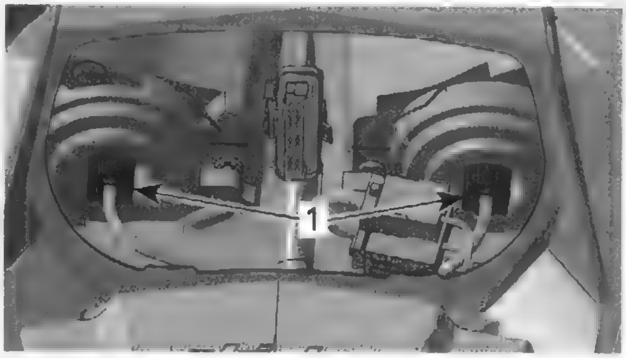
Gauge Support Removal

Remove *WINDSHIELD*, see procedure above.

Remove *HOOD*, see procedure in this section.

Remove the multifunction gauge. Refer to *LIGHTS, GAUGE AND ACCESSORIES* section.

Unplug headlight connectors.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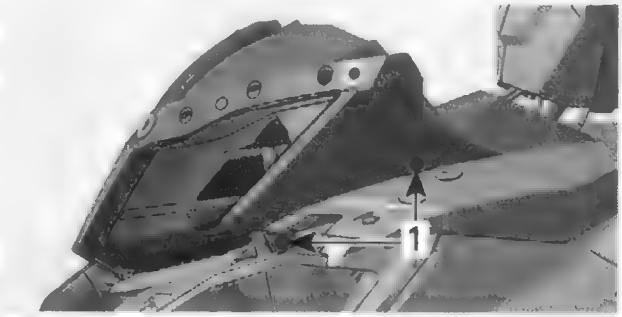
1. *Headlight connectors*

Remove the gauge support side screws.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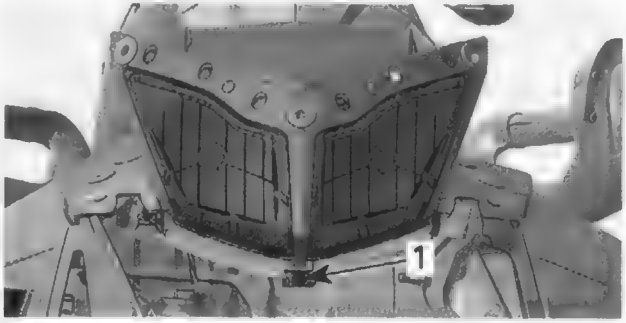
LH SIDE SHOWN
1. *Gauge support side screws*

Remove the screw under front of headlights.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1. *Remove this screw*

Slide gauge support forwards the lift it.

On **GSX models**, unplug the 12-volt power outlet connectors.

Installation

The installation is the reverse of removal procedure.

CONSOLE

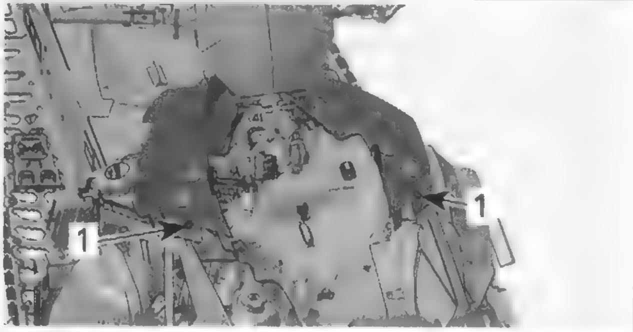
Console Removal

Remove LH and RH side panels.

Remove seat.

Remove the *GAUGE SUPPORT*, see procedure in this section.

Remove screws securing both sides of console front section.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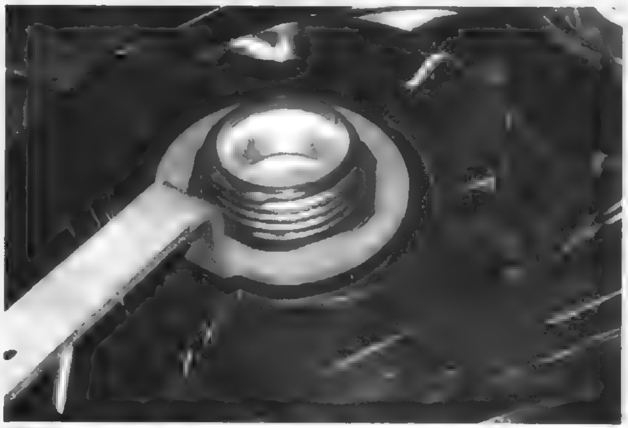
1. *Remove these screws*

Remove fuel tank cap.

Using the adjustment wrench (P/N 529 035 891), unscrew the fuel tank nut.



Lift up the console and unplug all connectors.

Install fuel tank cap.

Installation

The installation is the reverse of removal procedure.

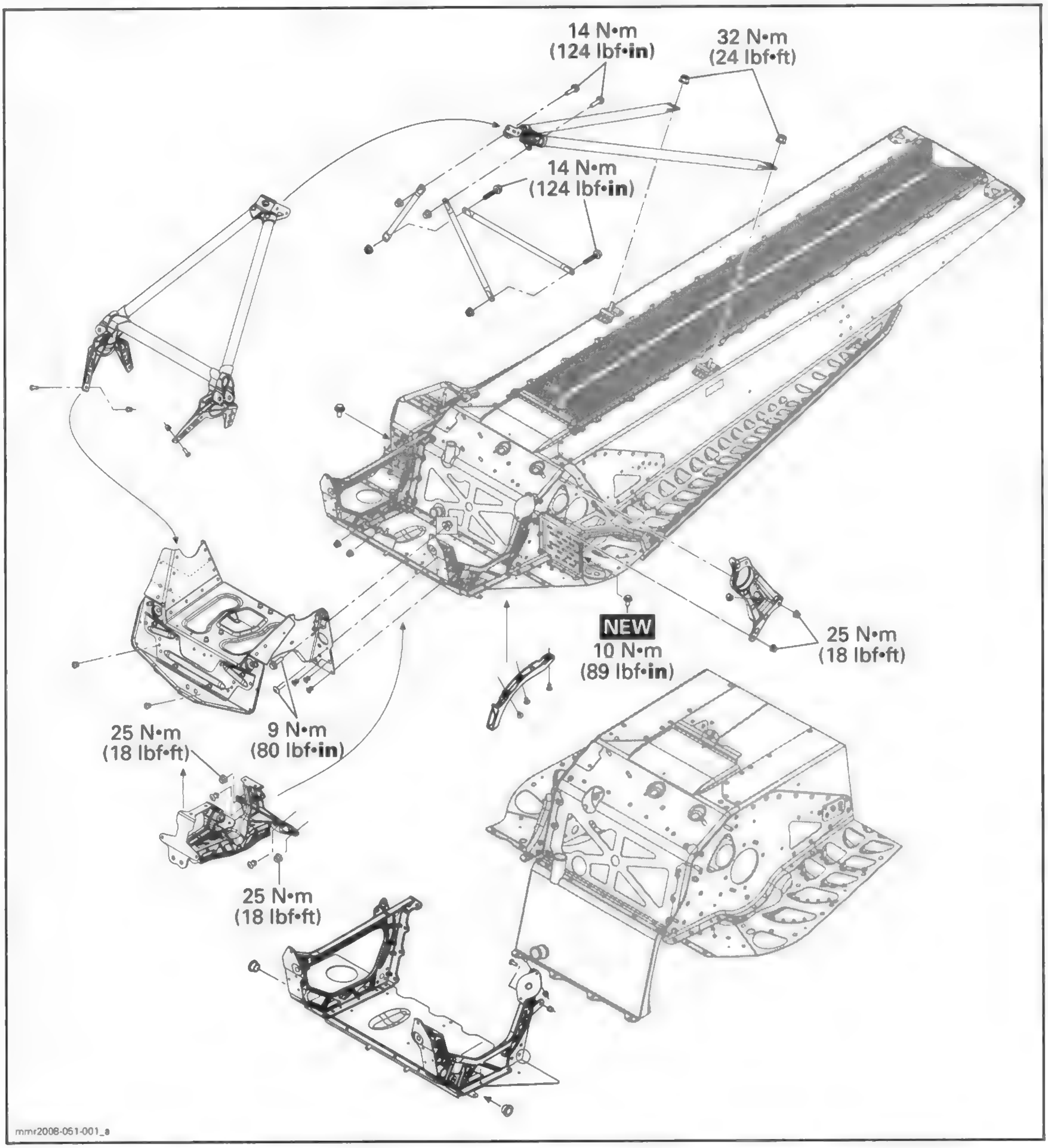
FRAME

SERVICE TOOLS

Description	Part Number	Page
Supertanium drill bit	529 031 800	491

SERVICE PRODUCTS

Description	Part Number	Page
XP-S synthetic chaincase oil	413 803 300	491


14 N•m
(124 lbf•in)
32 N•m
(24 lbf•ft)
14 N•m
(124 lbf•in)
NEW
10 N•m
(89 lbf•in)
25 N•m
(18 lbf•ft)
25 N•m
(18 lbf•ft)
9 N•m
(80 lbf•in)
25 N•m
(18 lbf•ft)
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GENERAL

During assembly/installation, use the torque values and the service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pins, etc.) must be replaced with new ones.

RIVET DRILLING PROCEDURE

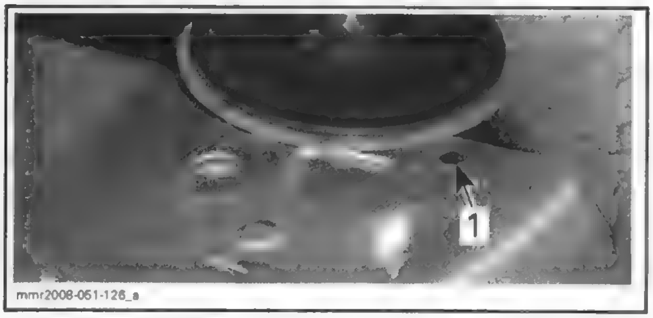
For proper drilling instructions and to prevent premature wear, follow the procedure below.

CAUTION: When removing rivets, make sure do not enlarge or deform the holes.

Self-Percing Rivet

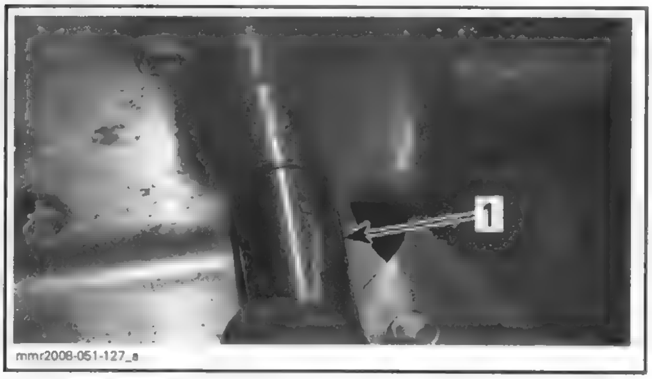
Recommended Method

Using a grinding disk, grind the rivet head.



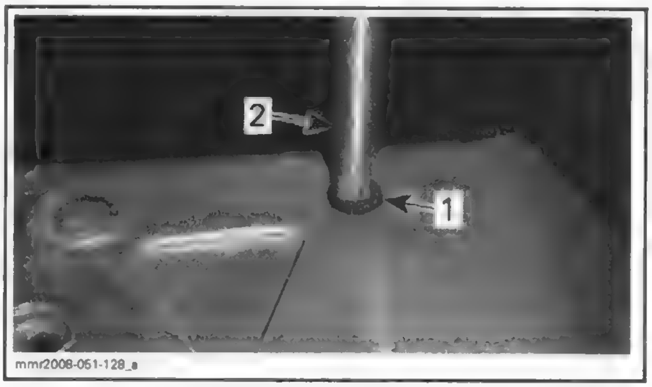
1. Rivet head removed

Support the frame around the rivet hole with a socket on the opposite side to avoid warpage.



1. 11 mm socket

Drive out remaining rivet using a punch.



1. Punch
2. Rivet

Alternative Method

Use the Supertanium drill bit (P/N 529 031 800), available in a 5 mm (3/16 in) size and shipped in packs of 2.

Partially drill **rivet end — not the rivet head**.

Always use a variable speed drill.

Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant chip is ejected.

NOTE: To increase bit life, use XP-S synthetic chaincase oil (P/N 413 803 300) as a cutting oil.

CAUTION: High speed drilling will cause excessive heat which may destroy the cutting edge of the bit; therefore, avoid using pneumatic drills.

Cut rivet using a chisel.

Remove riveted part.

Drive out remaining rivet head using a punch.

Pop Rivets

Use the Supertanium drill bit (P/N 529 031 800), available in a 5 mm (3/16 in) size and shipped in packs of 2.

Always use a variable speed drill.

Always drill **rivet head**.

Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant chip is ejected.

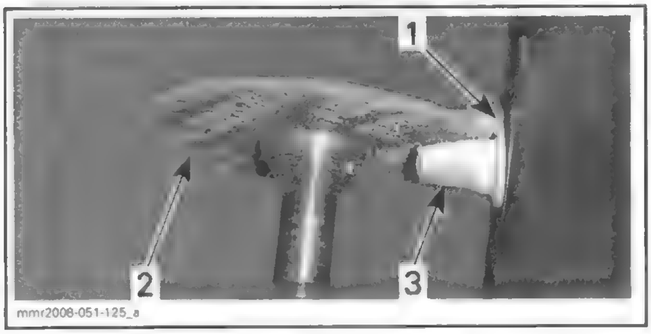
When rivet is located on plastic part, use pliers to avoid rivet turning and heating plastic.

Use a small punch to push the rivet end.

HUCK Rivets

Recommended Method

Using a cut-off tool, cut the rivet attachment without touching the shoulder.



1. *Rivet attachment shoulder*
2. *Cutter wheel*
3. *Rivet attachment*

NOTE: Apply a thin layer of grease on cutter wheel to increase its durability.

Break the rivet attachment shoulder using a chisel.

Use a small punch to push the rivet stem.

Alternative Method

Measure outside diameter of rivet stem and select appropriate drill bit.

Drill the **rivet stem — not the rivet head** until rivet attachment is freed.

Always use a variable speed drill.

Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant chip is ejected.

NOTE: When possible, use an angle grinder to grind rivet head or use an air hammer to cut the rivet attachment.

PROCEDURES

FRAME

Frame Cleaning

Clean frame and tunnel with appropriate cleaners and rinse with high pressure hose.

NOTE: For bare aluminum frames use only aluminum cleaner and follow instructions on container.

CAUTION: Never direct high-pressure water jet towards decals. They will peel off.

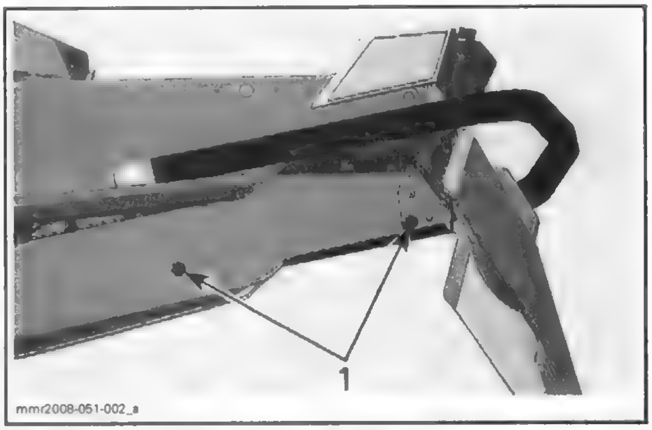
Frame Welding

No welds should be done on aluminum frame except if mentioned or required on a BRP Bulletin.

REAR BUMPER

Rear Bumper Removal

Underneath tunnel, remove bolts retaining rear bumper to tunnel.



TYPICAL — MX Z TRAIL MODEL SHOWN
1. *Rear bumper bolts on right side*

Pull rear bumper to remove it from vehicle.

Rear Bumper Installation

The installation is the reverse of the removal procedure.

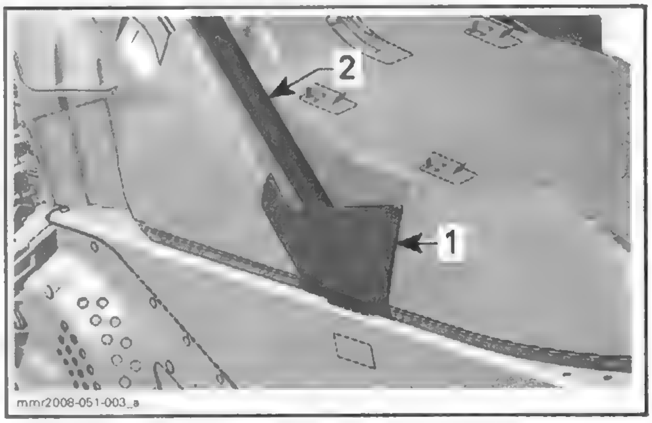
NOTE: Install all bolts before torquing them.

REAR FRAME MEMBER

Rear Frame Member Removal

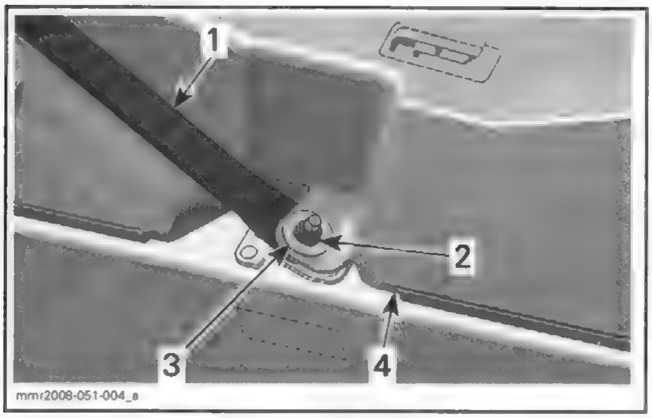
Refer to *BODY* section to remove the following:
- Seat
- Gauge support
- Console.

Remove trim panel at the bottom of rear frame member (one each side).



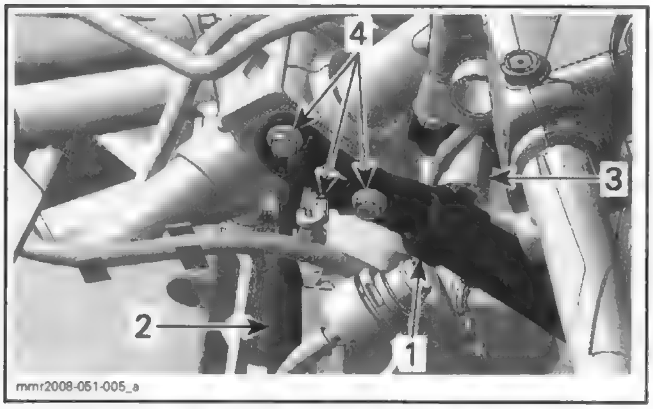
1. *Trim panel*
2. *Rear frame member*

Remove nut and shouldered washer securing rear frame member (one each side).



1. *Rear frame member*
2. *Nut to remove*
3. *Shouldered washer*
4. *Fuel tank*

Remove screws securing the rear frame member to steering column support and side frame members.



1. *Rear frame member*
2. *LH side frame member*
3. *Steering column support*
4. *Bolts to remove*

Remove rear frame member.

Rear Frame Member Installation

The installation is the reverse of the removal procedure.

NOTE: Install all bolts and nuts before tightening them.

FRONT FRAME MEMBER

Front Frame Member Removal

Refer to *BODY* section to remove the following:

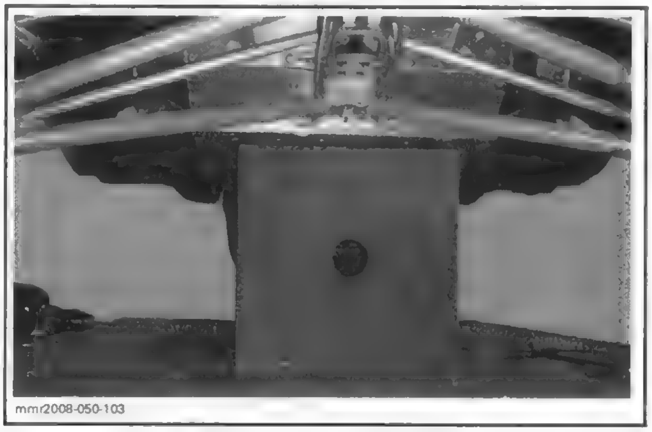
- Hood
- Console
- Gauge support.

Remove the secondary air intake silencer. Refer to *AIR INTAKE SYSTEM* section.

Remove the tuned pipe. Refer to *EXHAUST SYSTEM* section.

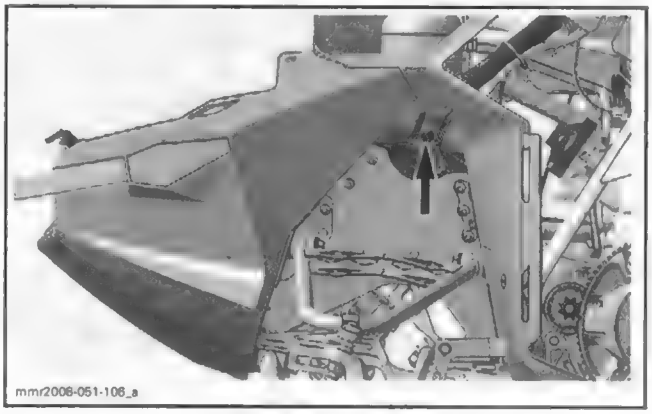
Lift front of vehicle until skis are off the ground.

Place the front portion of frame on a wooden box to support it securely.

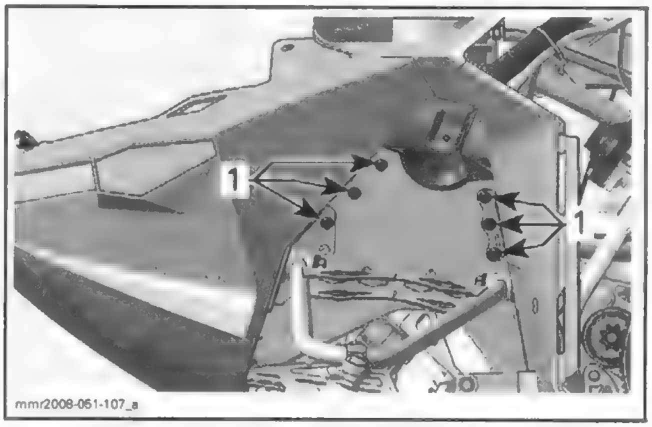


Remove front shock absorbers.

Drill the rivet retaining the front bottom pan to front frame member (one each side).

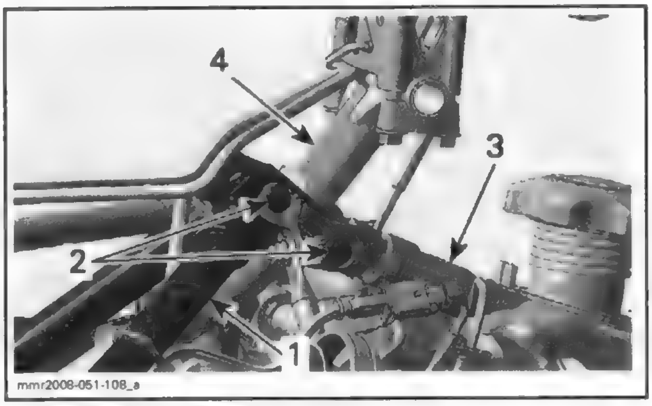


Remove HUCK rivets (six each side), see removal procedure at the beginning of this section.



1. *HUCK rivets*

Remove bolts securing front frame member, rear frame member and steering column support.



1. *Front frame member*
2. *Bolts to remove*
3. *Rear frame member*
4. *Steering column*

Remove the front frame member.

Front Frame Member Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Replace the HUCK rivets with the following parts.

NEW FASTENERS	
Hexagonal flanged bolt M6 x 20	(P/N 207 662 044)
Hexagonal flanged elastic stop nut M6	(P/N 233 261 414)

NOTE: Unless stated otherwise, install bolt heads toward outside of the vehicle.

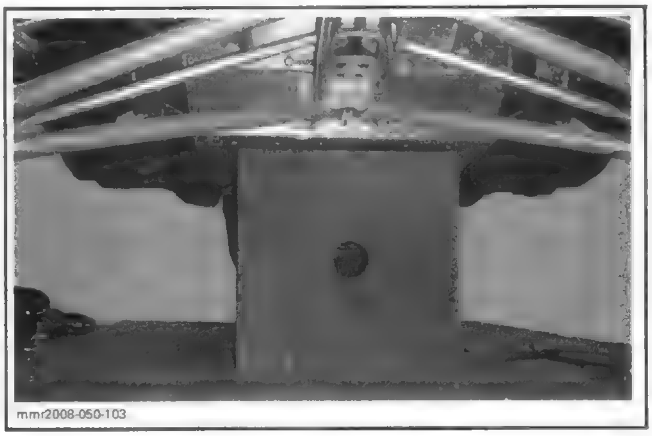
Torque new fasteners to 10 N•m (89 lbf•**in**).

FRONT CROSS MEMBER

Front Cross Member Removal

Lift front of vehicle until skis are off the ground.

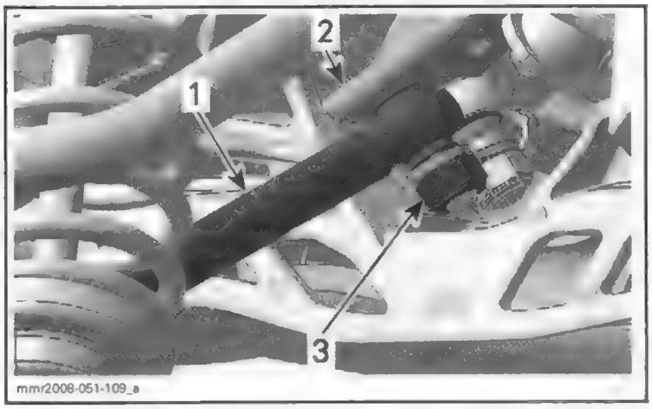
Place the front portion of frame on a wooden box to support it securely.



Remove the muffler and the tuned pipe. Refer to *EXHAUST SYSTEM* section.

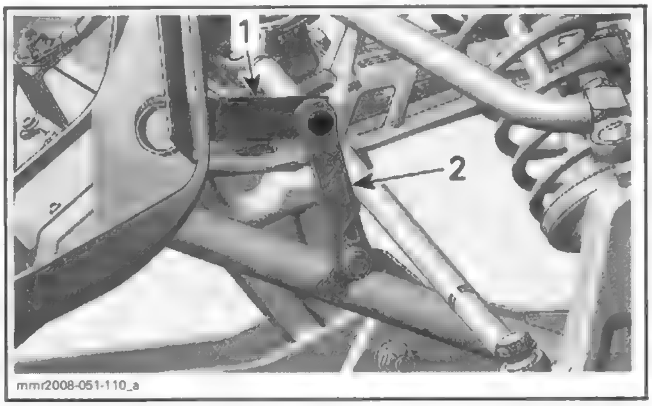
Remove the RH front suspension assembly by doing the following:

- Detach tie-rod end from steering column.



1. *Tie-rod*
2. *Steering column*
3. *Tie-rod end nut*

- Remove shock absorber upper bolt.
- Remove bolt linking stabilizer link and stabilizer lever.



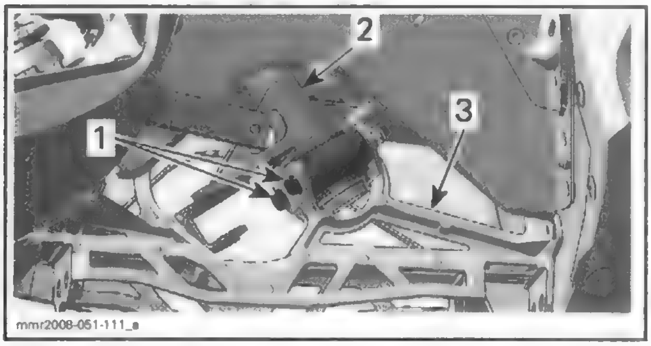
1. *Stabilizer lever*
2. *Stabilizer link*

- Remove upper and lower suspension arms bolts. Refer to *FRONT SUSPENSION* section.

- Pull suspension arms to remove the RH front suspension assembly.

NOTE: Repeat same procedure for the LH front suspension.

Remove bolts securing the bottom of steering column.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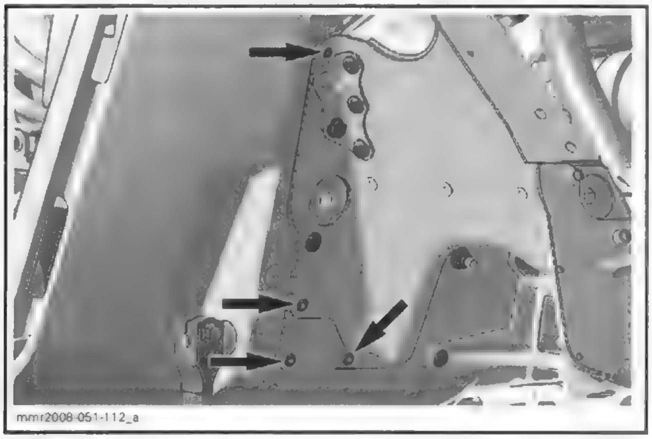
1. *Steering column bolts*
2. *Steering column*
3. *Lower suspension arm support*

Remove the front bottom pan. Refer to *BODY* section.

NOTE: Keep the front bumper installed on front bottom pan.

Drill the following rivets.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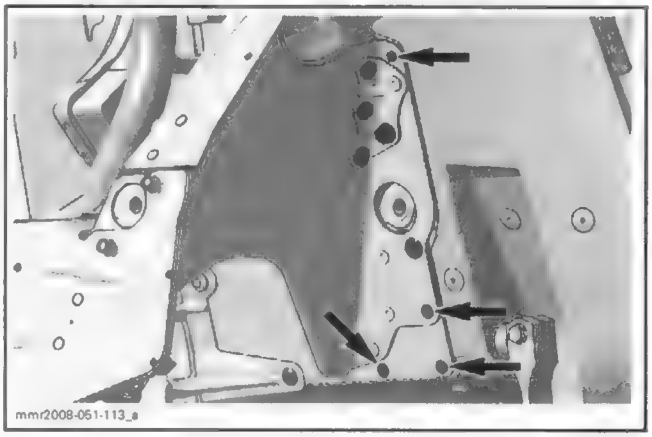
RH SIDE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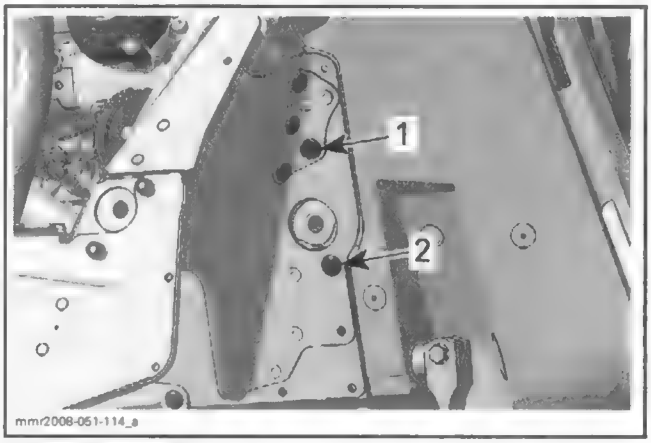
LH SIDE

Remove screws securing front cross member to frame (2 each side).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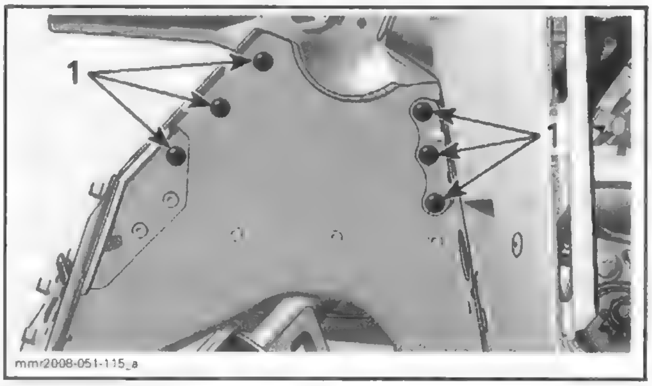
LH SIDE SHOWN
1. *Hexagonal flanged bolt*
2. *Torx screw*

Remove HUCK rivets (six each side), see removal procedure at the beginning of this section.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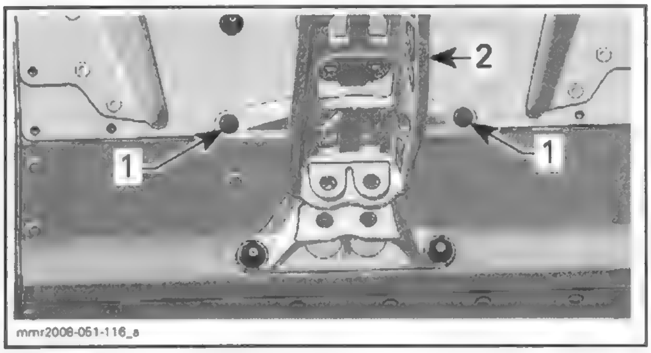
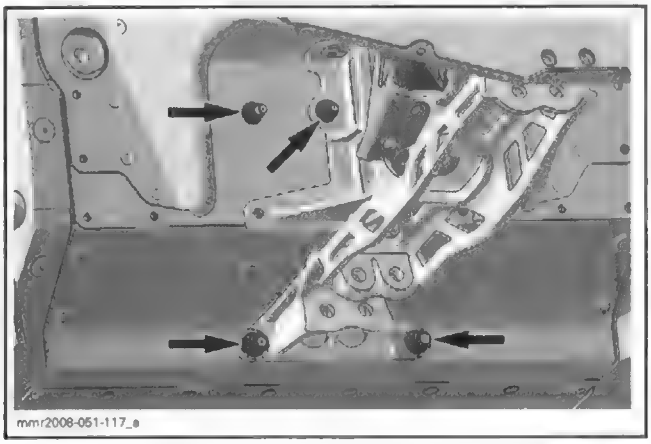
LH SIDE SHOWN
1. *HUCK rivets*

Grind rivets securing the lower suspension arm support to engine member.



1. Rivets
2. Lower suspension arm support

Remove the following nuts.



Remove the front cross member.

Front Cross Member Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Replace the HUCK rivets with the following parts.

NEW FASTENERS	
Hexagonal flanged bolt M6 x 20	(P/N 207 662 044)
Hexagonal flanged elastic stop nut M6	(P/N 233 261 414)

NOTE: Unless stated otherwise, install bolt heads toward outside of the vehicle.

Torque new fasteners to 10 N•m (89 lbf•**in**).

Reinstall all removed parts by using the appropriate installation procedure.

ENGINE MEMBER

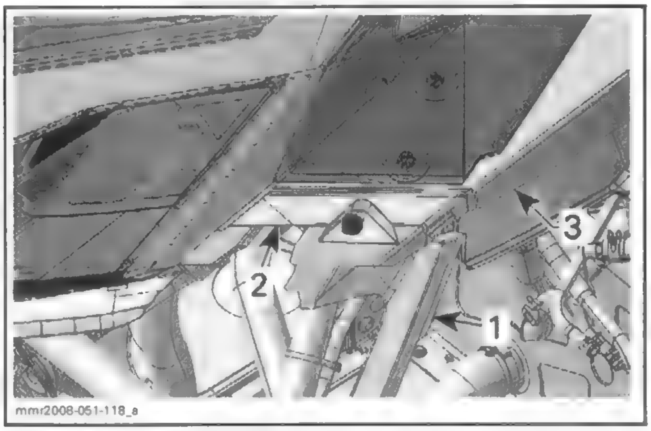
Engine Member Removal

Remove engine from vehicle. Refer to *ENGINE REMOVAL AND INSTALLATION* section.

Remove the *FRONT CROSS MEMBER*, see procedure in this section.

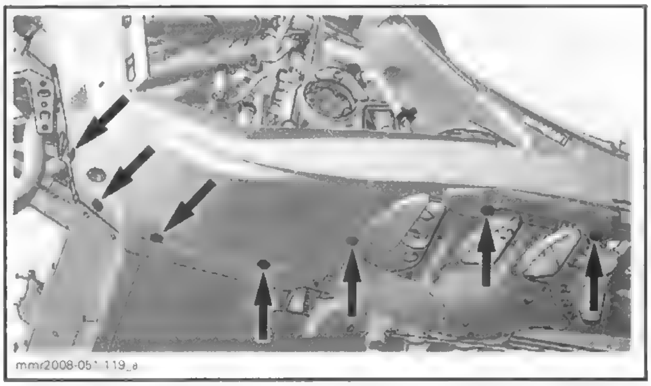
Remove stabilizer bar.

Remove screws retaining side bottom pan to headlight housing.

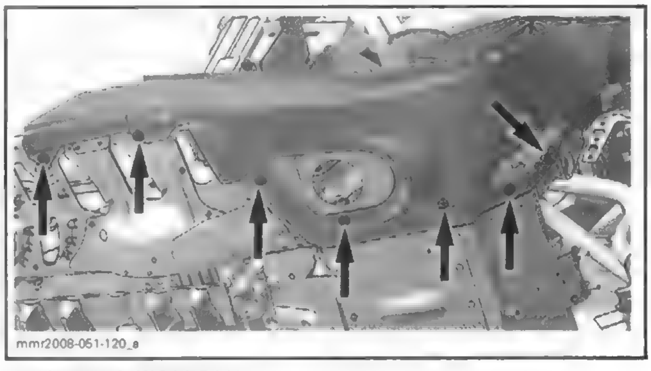


LH SIDE SHOWN
1. Side bottom pan
2. Headlight housing
3. Gauge support

Remove both side bottom pans by drilling the following rivets.

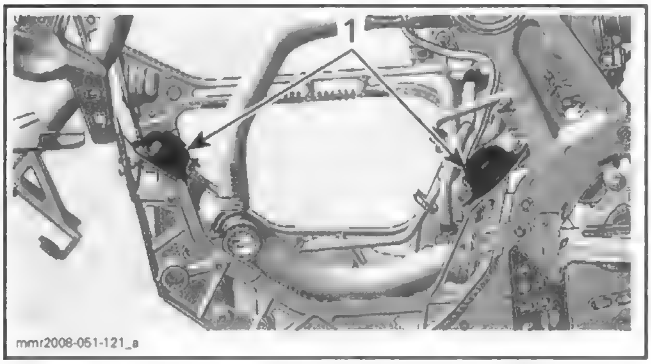


LH SIDE BOTTOM PAN



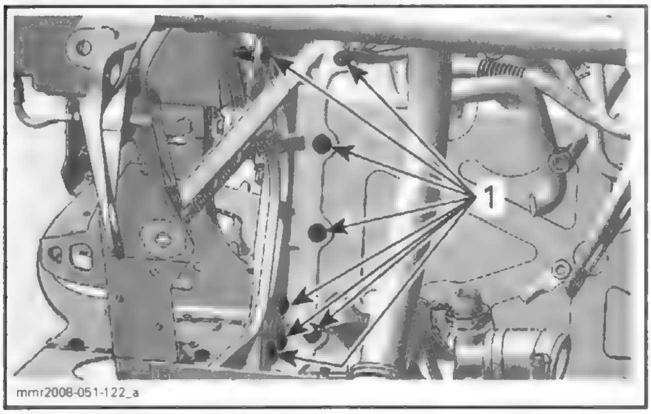
RH SIDE BOTTOM PAN

On LH side, remove front and rear engine rubber mounts.

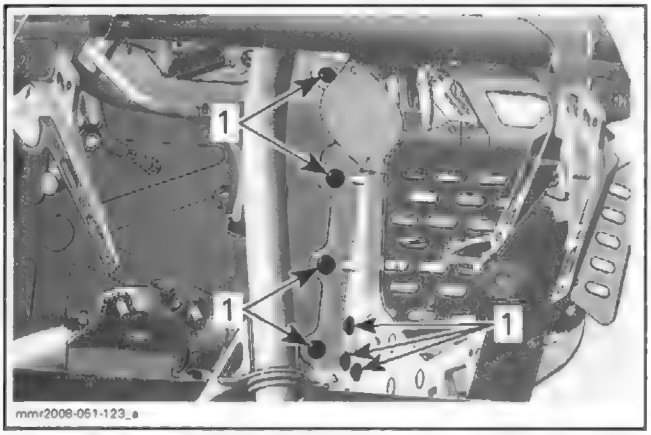


1. Engine rubber mounts

Remove HUCK rivets, see removal procedure at the beginning of this section.

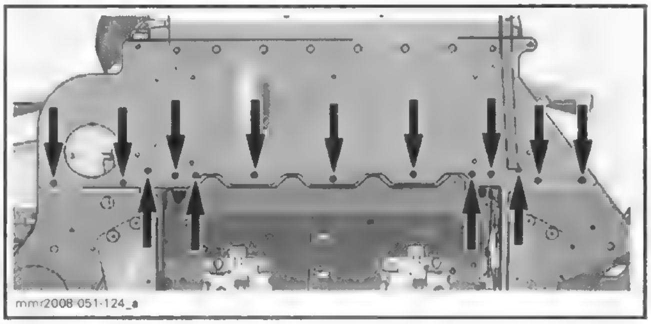


RH SIDE SHOWN
1. HUCK rivets



LH SIDE SHOWN
1. HUCK rivets

Drill or grind rivets securing engine member to frame.



Remove the engine member.

Engine Member Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Replace the HUCK rivets with the following parts.

NEW FASTENERS	
Hexagonal flanged bolt M6 x 20	(P/N 207 662 044)
Hexagonal flanged elastic stop nut M6	(P/N 233 261 414)

NOTE: Install bolt heads toward outside of the vehicle, except the one securing chaincase.

Torque new fasteners to 10 N•m (89 lbf•**in**).

Reinstall all removed parts by using the appropriate installation procedure.

500SS MODELS

MODEL			GSX 500SS	MX Z 500SS	
			SPORT	TNT	TRAIL
ENGINE					
Engine type			593		
Number of cylinders			2		
Bore		mm (in)	76 (2.992)		
Stroke		mm (in)	65.80 (2.591)		
Displacement		cm^3 (in^3)	597 (36.43)		
Compression ratio			12.00 ± 0.5		
Maximum power engine speed		± 100 RPM	8000		
Combustion chamber volume		cc	25.49 to 27.96		
RAVE spring	Color		Brown		
	Wire diameter	mm (in)	0.90 (0.035)		
	Minimum free length	mm (in)	48.50 (1.909)		
Piston ring type			Semi-trapezoidal		
Ring end gap	New	mm (in)	0.40 to 0.55 (.0157 to .0217)		
	Wear limit	mm (in)	1.0 (.039)		
Ring/piston groove clearance	New	mm (in)	0.040 to 0.090 (.0016 to .0035)		
	Wear limit	mm (in)	0.20 (.0079)		
Piston/cylinder wall clearance	New	mm (in)	0.120 ± 0.02 (.0047 ± .0008)		
	Wear limit	mm (in)	0.20 (.0079)		
Piston skirt wear	Wear limit	mm (in)	0.15 (.006)		
Cylinder head warpage	Wear limit	mm (in)	0.5 (.02)		
Cylinder taper	New (max.)	mm (in)	0.05 (.0020)		
	Wear limit	mm (in)	0.1 (.0039)		
Cylinder out of round	New (max.)	mm (in)	0.010 (.0004)		
	Wear limit	mm (in)	0.08 (.0031)		
Maximum crankshaft end play	New (max.)	mm (in)	0.3 (.0118)		
Maximum crankshaft deflection	Wear limit	mm (in)	MAG: 0.05 (.0020) PTO: 0.06 (.0024)		
Connecting rod big end axial play	New	mm (in)	0.390 to 0.740 (.0154 to .0291)		
	Wear limit	mm (in)	1.2 (.0472)		
COOLING SYSTEM					
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use premix coolant from BRP (P/N 219 700 362) or coolant specifically formulated for aluminum engines		
	Quantity	L (U.S. gal.)	5.5 (1.45)		
Thermostat opening temperature		°C (°F)	37 (98.6)		
Radiator cap opening pressure		kPa (PSI)	90 (13)		

MODEL		GSX 500SS	MX Z 500SS	
		SPORT	TNT	TRAIL
LUBRICATION SYSTEM				
Injection oil	Type	XP-S mineral injection oil		
	Quantity L (U.S. oz)	3.7 (125.1)		
FUEL SYSTEM				
Carburetor type		TM40		
Main jet		390		
Needle jet		P-0M		
Pilot jet		17.5		
Jet needle identification		9CEY01 – 58		
Clip position number		3		
Slide cut-away		2.0		
Idle throttle slide height mm (in)		1.5 ± 0.1 (.059 ± .004)		
Float adjustment mm (in)		Not adjustable		
Air or pilot screw adjustment ± 1/16 turn		1.5		
Idle speed ± 200 RPM		1600		
Gas type		Unleaded		
Pump octane number	Inside North America ((R+M)/2)	87 or higher		
	Outside North America (RON)	92 or higher		
Fuel tank capacity L (U.S. gal)		40 (10.6)		
Gas/oil ratio		Injection		
ELECTRICAL SYSTEM				
Magneto generator output W		360 @ 6000 RPM		
Ignition type		C.D.I.		
Spark plug	Make and type	NGK BR10ECS		
	Gap mm (in)	Not adjustable 0.70 to 0.80 (.028 to .032)		
Ignition timing BTDC mm (in)		2.49 (.098) @ 3500 RPM		
Trigger coil Ω		190 to 300		
Lighting coil Ω		0.1 to 1.0		
High tension coil	Primary Ω	0.3 to 0.7		
	Secondary KΩ	18 to 26 (with caps)		
Battery		12 V, 18 A•h (with electric starter)		
Headlamp W		2 x 60/55 (H4)		
Taillight and stoplight W		5/21		
Fuse	Main A	30 (with electric starter)		
	ECM A	5 (with electric starter)		
	Headlamp A	15		
	Accessories A	15		
	Fuel level sensor A	0.25 (if applicable)		

MODEL		GSX 500SS	MX Z 500SS	
		SPORT	TNT	TRAIL
DRIVE SYSTEM				
Chaincase oil	Type	XP-S synthetic chaincase oil		
	Quantity mL (U.S. oz)	250 (8.5)		
Chain drive ratio		24/45	25/45	
Chain	Pitch in	3/8		
	Type/links qty/plate qty	Silent 13/104		
Drive pulley type		TRA III		
Drive pulley calibration	Clutch engagement ± 100 RPM	3400	3800	
	Spring color	Blue/Purple	Purple/Purple	
	Spring length mm (in)	96.6 (3.803)	106.98 (4.212)	
	Pin	Solid (P/N 417 004 308)		
	Ramp	412		
	Screw position	2		
Driven pulley type	Type	QRS		
	Spring color	Black		
	Spring preload	0		
	Cam angle	42°		
Pulley distance	Z mm (in)	Not adjustable 21.2 (.835)		
Offset	X mm (in)	Not adjustable 37.15 (1.463)		
Drive belt part number	P/N	417 300 197		
Drive belt	Width mm (in)	37.3 (1.469)		
	Wear limit mm (in)	34.9 (1.374)		
Drive belt adjustment	Deflection mm (in)	32 ± 5 (1.260 ± .197)		
	Force kgf (lbf)	11.30 (24.91)		
Track	Width mm (in)	381 (15)		
	Length m (in)	3.05 (120)		
	Profile height mm (in)	25.4 (1.0)	25.4 (1.0) EUR: 31.8 (1.25)	25.4 (1.0)
Track adjustment	Deflection mm (in)	30 to 35 (1.181 to 1.378)		
	Force kgf (lbf)	7.3 (16)		
BRAKE SYSTEM				
Brake lining minimum thickness	mm (in)	1 (.039)		
Brake disk minimum thickness	mm (in)	4.5 (.177)		
Brake fluid	Type	DOT 4		
	Quantity mL (U.S. oz)	60 (2.0)		

MODEL		**GSX 500SS**	**MX Z 500SS**	
		SPORT	**TNT**	**TRAIL**
SUSPENSION				
FRONT				
Suspension type		REV-XP		
Suspension maximum travel	mm (in)	229 (9)		
Shock absorber type		Motion control	H.P.G. T/A (aluminum) EUR: H.P.G. clicker T/A (aluminum)	Motion control
Sway bar type		Link		
REAR				
Suspension type		SC-5		
Suspension maximum travel	mm (in)	381 (15)		
Shock absorber type	Center	Motion control	H.P.G. T/A (aluminum)	Motion control
	Rear	Motion control	H.P.G. T/A (aluminum) EUR: H.P.G. racing clicker (aluminum)	Motion control
Stroke limiter standard position		3		
STEERING SYSTEM				
Ski type		Pilot 5.7		
Toe-out	mm (in)	0 (0)		
Camber		0°		
VEHICLE INFORMATIONS				
Mass (dry)	kg (lb)	198 (437)	181 (399)	188 (415)
Length	m (in)	2.89 (113.8)		
Width	m (in)	1.22 (48)		
Height	m (in)	1.21 (47.7)	1.0 (39.4)	1.17 (46)
Ski stance (carbide to carbide)	m (in)	1.07 (42)		
MATERIAL				
Frame		Aluminum		
Bottom pan and side panels		Polypropylene		
Hood		Surlyn		

800R MODELS

MODEL			GSX 800R POWER TEK
			LIMITED
ENGINE			
Engine type			797
Number of cylinders			2
Bore		mm (in)	82 (3.228)
Stroke		mm (in)	75.70 (2.980)
Displacement		cm³ (in³)	799.5 (48.79)
Compression ratio			12.5 ± 0.5
Maximum power engine speed		± 100 RPM	8150
Combustion chamber volume		cc	34.08 to 37.26
RAVE spring	Wire diameter	mm (in)	0.70 (0.028)
	Minimum free length	mm (in)	35.00 (1.378)
Piston ring type			Semi-trapezoidal
Ring end gap	New	mm (in)	0.40 to 0.60 (.0157 to .0236)
	Wear limit	mm (in)	1.0 (.039)
Ring/piston groove clearance	New	mm (in)	0.060 to 0.100 (.0024 to .0039)
	Wear limit	mm (in)	0.20 (.0079)
Piston/cylinder wall clearance	New	mm (in)	0.108 to 0.148 (.0043 to .0058)
	Wear limit	mm (in)	0.20 (.0079)
Piston skirt wear	Wear limit	mm (in)	0.15 (.006)
Cylinder head warpage	Wear limit	mm (in)	0.5 (.02)
Cylinder taper	New (max.)	mm (in)	0.05 (.0020)
	Wear limit	mm (in)	0.1 (.0039)
Cylinder out of round	New (max.)	mm (in)	0.010 (.0004)
	Wear limit	mm (in)	0.08 (.0031)
Maximum crankshaft end play	New (max.)	mm (in)	0.3 (.012)
Maximum crankshaft deflection	Wear limit	mm (in)	MAG: 0.05 (.0020) PTO: 0.06 (.0024)
Connecting rod big end axial play	New	mm (in)	0.230 to 0.620 (.0091 to .0244)
	Wear limit	mm (in)	1.2 (.0472)
COOLING SYSTEM			
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use premix coolant from BRP (P/N 219 700 362) or coolant specifically formulated for aluminum engines
	Quantity	L (U.S. gal.)	6 (1.59)
Thermostat opening temperature		°C (°F)	37 (98.6)
Radiator cap opening pressure		kPa (PSI)	90 (13)

MODEL		**GSX 800R POWER TEK**
		LIMITED
LUBRICATION SYSTEM		
Injection oil	Type	XP-S 2-stroke synthetic blend
	Quantity L (U.S. oz)	3.7 (125.1)
FUEL SYSTEM		
Carburetor type		TM40
Main jet		480
Needle jet		P-0M
Pilot jet		17.5
Jet needle identification		9EGI04 – 58
Clip position number		Not adjustable
Slide cut-away		2.0
Idle throttle slide height	mm (in)	1.6 ± 0.1 (.063 ± .004)
Float adjustment	mm (in)	Not adjustable
Air or pilot screw adjustment	± 1/16 turn	1.5
Idle speed	± 200 RPM	1600
Gas type		Unleaded
Pump octane number	Inside North America ((R+M)/2)	91 or higher
	Outside North America (RON)	95 or higher
Fuel tank capacity	L (U.S. gal)	40 (10.6)
Gas/oil ratio		Injection
ELECTRICAL SYSTEM		
Magneto generator output	W	360 @ 6000 RPM
Ignition type		C.D.I.
Spark plug	Make and type	NGK BR9ECS
	Gap mm (in)	Not adjustable 0.70 to 0.80 (.028 to .032)
Ignition timing BTDC	mm (in)	2.37 (.093) @ 3500 RPM
Trigger coil	Ω	190 to 300
Lighting coil	Ω	0.1 to 1.0
High tension coil	Primary Ω	0.3 to 0.7
	Secondary KΩ	18 to 26 (with caps)
Battery		12 V, 18 A•h (with electric starter) 12 V, 3 A•h (without electric starter)
Headlamp	W	2 x 60/55 (H4)
Taillight and stoplight	W	5/21
Fuse	Main A	30 (with electric starter)
	ECM A	5 (with electric starter)
	Headlamp A	15
	Accessories A	15
	Fuel level sensor A	0.25 (if applicable)

MODEL			GSX 800R POWER TEK
			LIMITED
DRIVE SYSTEM			
Chaincase oil	Type		XP-S synthetic chaincase oil
	Quantity	mL (U.S. oz)	250 (8.5)
Chain drive ratio			25/45
Chain	Pitch	in	3/8
	Type/links qty/plate qty		Silent 104/13
Drive pulley type			TRA VII
Drive pulley calibration	Clutch engagement	± 100 RPM	3800
	Spring color		Blue/Green
	Spring length	mm (in)	105.7 (4.161)
	Pin		Solid (P/N 417 222 594)
	Ramp		414
	Screw position		3
Driven pulley type	Type		QRS
	Spring color		Purple
	Spring preload		0
	Cam angle		44°
Pulley distance	Z	mm (in)	Not adjustable 21.2 (.835)
Offset	X	mm (in)	Not adjustable 37.15 (1.463)
Drive belt part number		P/N	417 300 166
Drive belt	Width	mm (in)	37.7 (1.484)
	Wear limit	mm (in)	35.3 (1.390)
Drive belt adjustment	Deflection	mm (in)	32 ± 5 (1.260 ± .197)
	Force	kgf (lbf)	11.30 (24.91)
Track	Width	mm (in)	381 (15)
	Length	m (in)	3.05 (120)
	Profile height	mm (in)	25.4 (1)
Track adjustment	Deflection	mm (in)	30 to 35 (1.181 to 1.378)
	Force	kgf (lbf)	7.3 (16)
BRAKE SYSTEM			
Brake lining minimum thickness		mm (in)	1 (.039)
Brake disk minimum thichness		mm (in)	4.5 (.177)
Brake fluid	Type		DOT 4
	Quantity	mL (U.S. oz)	60 (2.0)

MODEL		GSX 800R POWER TEK
		LIMITED
SUSPENSION		
FRONT		
Suspension type		REV-XP
Suspension maximum travel	mm (in)	229 (9)
Shock absorber type		H.P.G.
Sway bar type		Link
REAR		
Suspension type		SC-5
Suspension maximum travel	mm (in)	381 (15)
Shock absorber type	Center	H.P.G.
	Rear	H.P.G. VR
Stroke limiter standard position		4
STEERING SYSTEM		
Ski type		Pilot 5.7
Toe-out	mm (in)	0 (0)
Camber		0°
VEHICLE INFORMATIONS		
Mass (dry)	kg (lb)	206 (455)
Length	m (in)	2.89 (113.8)
Width	m (in)	1.22 (47.9)
Height	m (in)	1.21 (47.7)
Ski stance (carbide to carbide)	m (in)	1.07 (42)
MATERIAL		
Frame		Aluminum
Bottom pan and side panels		Polypropylene
Hood		Surlyn

MODEL			MX Z 800R POWER TEK			
			ADRENALINE	**X**	**RENEGADE**	**RENEGADE X**
ENGINE						
Engine type			797			
Number of cylinders			2			
Bore		mm (in)	82 (3.228)			
Stroke		mm (in)	75.70 (2.980)			
Displacement		cm³ (in³)	799.5 (48.79)			
Compression ratio			12.5 ± 0.5			
Maximum power engine speed		± 100 RPM	8150			
Combustion chamber volume		cc	34.08 to 37.26			
RAVE spring	Wire diameter	mm (in)	0.70 (0.028)			
	Minimum free length	mm (in)	35.00 (1.378)			
Piston ring type			Semi-trapezoidal			
Ring end gap	New	mm (in)	0.40 to 0.60 (.0157 to .0236)			
	Wear limit	mm (in)	1.0 (.039)			
Ring/piston groove clearance	New	mm (in)	0.060 to 0.100 (.0024 to .0039)			
	Wear limit	mm (in)	0.20 (.0079)			
Piston/cylinder wall clearance	New	mm (in)	0.108 to 0.148 (.0043 to .0058)			
	Wear limit	mm (in)	0.20 (.0079)			
Piston skirt wear	Wear limit	mm (in)	0.15 (.006)			
Cylinder head warpage	Wear limit	mm (in)	0.5 (.02)			
Cylinder taper	New (max.)	mm (in)	0.05 (.0020)			
	Wear limit	mm (in)	0.1 (.0039)			
Cylinder out of round	New (max.)	mm (in)	0.010 (.0004)			
	Wear limit	mm (in)	0.08 (.0031)			
Maximum crankshaft end play	New (max.)	mm (in)	0.3 (.012)			
Maximum crankshaft deflection	Wear limit	mm (in)	MAG: 0.05 (.0020) PTO: 0.06 (.0024)			
Connecting rod big end axial play	New	mm (in)	0.230 to 0.620 (.0091 to .0244)			
	Wear limit	mm (in)	1.2 (.0472)			
COOLING SYSTEM						
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use premix coolant from BRP (P/N 219 700 362) or coolant specifically formulated for aluminum engines			
	Quantity	L (U.S. gal.)	6 (1.59)		6.3 (1.66)	
Thermostat opening temperature		°C (°F)	37 (98.6)			
Radiator cap opening pressure		kPa (PSI)	90 (13)			

MODEL			MX Z 800R POWER TEK			
			ADRENALINE	X	RENEGADE	RENEGADE X
LUBRICATION SYSTEM						
Injection oil	Type		XP-S 2-stroke synthetic blend			
	Quantity	L (U.S. oz)	3.7 (125.1)			
FUEL SYSTEM						
Carburetor type			TM40			
Main jet			480			
Needle jet			P-0M			
Pilot jet			17.5			
Jet needle identification			9EGI04 – 58			
Clip position number			Not adjustable			
Slide cut-away			2.0			
Idle throttle slide height		mm (in)	1.6 ± 0.1 (.063 ± .004)			
Float adjustment		mm (in)	Not adjustable			
Air or pilot screw adjustment		± 1/16 turn	1.5			
Idle speed		± 200 RPM	1600			
Gas type			Unleaded			
Pump octane number	Inside North America ((R+M)/2)		91 or higher			
	Outside North America (RON)		95 or higher			
Fuel tank capacity		L (U.S. gal)	40 (10.6)			
Gas/oil ratio			Injection			
ELECTRICAL SYSTEM						
Magneto generator output		W	360 @ 6000 RPM			
Ignition type			C.D.I.			
Spark plug	Make and type		NGK BR9ECS			
	Gap	mm (in)	Not adjustable 0.70 to 0.80 (.028 to .032)			
Ignition timing BTDC		mm (in)	2.37 (.093) @ 3500 RPM			
Trigger coil		Ω	190 to 300			
Lighting coil		Ω	0.1 to 1.0			
High tension coil	Primary	Ω	0.3 to 0.7			
	Secondary	KΩ	18 to 26 (with caps)			
Battery			12 V, 18 A•h (with electric starter) 12 V, 3 A•h (without electric starter)			
Headlamp		W	2 x 60/55 (H4)			
Taillight and stoplight		W	5/21			
Fuse	Main	A	30 (with electric starter)			
	ECM	A	5 (with electric starter)			
	Headlamp	A	15			
	Accessories	A	15			
	Fuel level sensor	A	0.25 (if applicable)			

MODEL			MX Z 800R POWER TEK			
			ADRENALINE	X	RENEGADE	RENEGADE X
DRIVE SYSTEM						
Chaincase oil	Type		XP-S synthetic chaincase oil			
	Quantity	mL (U.S. oz)	250 (8.5)			
Chain drive ratio			27/45		25/45	
Chain	Pitch	in	3/8			
	Type/links qty/plate qty		Silent 106/13		Silent 104/13	
Drive pulley type			TRA VII			
Drive pulley calibration	Clutch engagement	± 100 RPM	3800			
	Spring color		Purple/Blue			
	Spring length	mm (in)	114.6 (4.512)			
	Pin		Solid (P/N 417 222 594)			
	Ramp		414		413	
	Screw position		3			
Driven pulley type	Type		QRS			
	Spring color		Purple			
	Spring preload		0			
	Cam angle		44°		42°	
Pulley distance	Z	mm (in)	Not adjustable 21.2 (.835)			
Offset	X	mm (in)	Not adjustable 37.15 (1.463)			
Drive belt part number		P/N	417 300 166			
Drive belt	Width	mm (in)	37.7 (1.484)			
	Wear limit	mm (in)	35.3 (1.390)			
Drive belt adjustment	Deflection	mm (in)	32 ± 5 (1.260 ± .197)			
	Force	kgf (lbf)	11.30 (24.91)			
Track	Width	mm (in)	381 (15)		406.4 (16)	
	Length	m (in)	3.05 (120)		3.49 (137)	
	Profile height	mm (in)	25.4 (1)	31.8 (1.25)		
Track adjustment	Deflection	mm (in)	30 to 35 (1.181 to 1.378)			
	Force	kgf (lbf)	7.3 (16)			
BRAKE SYSTEM						
Brake lining minimum thickness		mm (in)	1 (.039)			
Brake disk minimum thickness		mm (in)	4.5 (.177)			
Brake fluid	Type		DOT 4			
	Quantity	mL (U.S. oz)	60 (2.0)			

MODEL		MX Z 800R POWER TEK			
		ADRENALINE	X	RENEGADE	RENEGADE X
SUSPENSION					
FRONT					
Suspension type		REV-XP			
Suspension maximum travel	mm (in)	229 (9)			
Shock absorber type		H.P.G.	H.P.G. clicker T/A EUR: H.P.G. clicker T/A (aluminum)	H.P.G.	H.P.G. clicker T/A EUR: H.P.G. clicker T/A (aluminum)
Sway bar type		Link			
REAR					
Suspension type		SC-5			
Suspension maximum travel	mm (in)	381 (15)		406 (16)	
Shock absorber type	Center	H.P.G.	H.P.G. T/A (aluminum)	H.P.G.	H.P.G. T/A (aluminum)
	Rear	H.P.G.	H.P.G. racing clicker (aluminum)	H.P.G.	H.P.G. racing clicker (aluminum)
Stroke limiter standard position		3			
STEERING SYSTEM					
Ski type		Pilot 5.7			
Toe-out	mm (in)	0 (0)			
Camber		0°			
VEHICLE INFORMATIONS					
Mass (dry)	kg (lb)	197 (435)	193 (425)	202 (445)	198 (437)
Length	m (in)	2.89 (113.8)		3.11 (122.4)	3.11 (122.4) EUR: 3.18 (125)
Width	m (in)	1.22 (47.9)			1.22 (47.9) EUR: 1.25 (49.1)
Height	m (in)	1.17 (46)	1 (39.4)	1.17 (46)	1 (39.4)
Ski stance (carbide to carbide)	m (in)	1.07 (42)			
MATERIAL					
Frame		Aluminum			
Bottom pan and side panels		Polypropylene			
Hood		Surlyn			

MODEL			SUMMIT 800R POWER TEK	
			EVEREST	X
ENGINE				
Engine type			797	
Number of cylinders			2	
Bore		mm (in)	82 (3.228)	
Stroke		mm (in)	75.70 (2.980)	
Displacement		cm³ (in³)	799.5 (48.79)	
Compression ratio			12.5 ± 0.5	
Maximum power engine speed		± 100 RPM	8150	
Combustion chamber volume		cc	34.08 to 37.26	
RAVE spring	Wire diameter	mm (in)	0.70 (0.028)	
	Minimum free length	mm (in)	35.00 (1.378)	
Piston ring type			Semi-trapezoidal	
Ring end gap	New	mm (in)	0.40 to 0.60 (.0157 to .0236)	
	Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance	New	mm (in)	0.060 to 0.100 (.0024 to .0039)	
	Wear limit	mm (in)	0.20 (.0079)	
Piston/cylinder wall clearance	New	mm (in)	0.108 to 0.148 (.0043 to .0058)	
	Wear limit	mm (in)	0.20 (.0079)	
Piston skirt wear	Wear limit	mm (in)	0.15 (.006)	
Cylinder head warpage	Wear limit	mm (in)	0.5 (.02)	
Cylinder taper	New (max.)	mm (in)	0.05 (.0020)	
	Wear limit	mm (in)	0.1 (.0039)	
Cylinder out of round	New (max.)	mm (in)	0.010 (.0004)	
	Wear limit	mm (in)	0.08 (.0031)	
Maximum crankshaft end play	New (max.)	mm (in)	0.3 (.012)	
Maximum crankshaft deflection	Wear limit	mm (in)	MAG: 0.05 (.0020) PTO: 0.06 (.0024)	
Connecting rod big end axial play	New	mm (in)	0.230 to 0.620 (.0091 to .0244)	
	Wear limit	mm (in)	1.2 (.0472)	
COOLING SYSTEM				
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use premix coolant from BRP (P/N 219 700 362) or coolant specifically formulated for aluminum engines	
	Quantity	L (U.S. gal.)	146" track: 6.47 (1.69) 154" track: 6.5 (1.72)	146" track: 6.4 (1.69) 154" track: 6.5 (1.72) 163" track: 6.6 (1.74)
Thermostat opening temperature		°C (°F)	37 (98.6)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
LUBRICATION SYSTEM				
Injection oil	Type		XP-S 2-stroke synthetic blend	
	Quantity	L (U.S. oz)	3.7 (125.1)	

MODEL			SUMMIT 800R POWER TEK	
			EVEREST	X
FUEL SYSTEM				
Carburetor type			TM40	
Main jet			480	
Needle jet			P-0M	
Pilot jet			17.5	
Jet needle identification			9EGI04 – 58	
Clip position number			Not adjustable	
Slide cut-away			2.0	
Idle throttle slide height		mm (in)	2.0 ± 0.1 (.079 ± .004)	
Float adjustment		mm (in)	Not adjustable	
Air or pilot screw adjustment		± 1/16 turn	1.5	
Idle speed		± 200 RPM	1900	
Gas type			Unleaded	
Pump octane number	Inside North America ((R+M)/2)		91 or higher	
	Outside North America (RON)		95 or higher	
Fuel tank capacity		L (U.S. gal)	40 (10.6)	
Gas/oil ratio			Injection	
ELECTRICAL SYSTEM				
Magneto generator output		W	360 @ 6000 RPM	
Ignition type			C.D.I.	
Spark plug	Make and type		NGK BR9ECS	
	Gap	mm (in)	Not adjustable 0.70 to 0.80 (.028 to .032)	
Ignition timing BTDC		mm (in)	2.37 (.093) @ 3500 RPM	
Trigger coil		Ω	190 to 300	
Lighting coil		Ω	0.1 to 1.0	
High tension coil	Primary	Ω	0.3 to 0.7	
	Secondary	KΩ	18 to 26 (with caps)	
Battery			12 V, 18 A•h (with electric starter) 12 V, 3 A•h (without electric starter)	
Headlamp		W	2 x 60/55 (H4)	
Taillight and stoplight		W	5/21	
Fuse	Main	A	30 (with electric starter)	
	ECM	A	5 (with electric starter)	
	Headlamp	A	15	
	Accessories	A	15	
	Fuel level sensor	A	0.25 (if applicable)	
DRIVE SYSTEM				
Chaincase oil	Type		XP-S synthetic chaincase oil	
	Quantity	mL (U.S. oz)	250 (8.5)	
Chain drive ratio			146" track: 23/45 154" track: 21/45	146" track: 23/45 154" Powder Max: 21/45 154" track (EUR): 23/49 163" track: 21/49

MODEL			SUMMIT 800R POWER TEK	
			EVEREST	X
DRIVE SYSTEM (cont'd)				
Chain	Pitch	in	3/8	
	Type/links qty/plate qty		146" track: silent 104/13 154" track: silent 102/13	146" track: silent 104/13 154" Powder Max: silent 102/13 154" track (EUR): silent 106/13 163" track: silent 106/13
Drive pulley type			TRA VII	
Drive pulley calibration	Clutch engagement	± 100 RPM	3800	
	Spring color		Purple/Purple	Purple/Purple 154" track (EUR): Purple/Blue
	Spring length	mm (in)	106.98 (4.212)	106.98 (4.212) 154" track (EUR): 114.6 (4.512)
	Pin		146" track: hollow/threaded (P/N 417 222 707) 154" track: hollow/threaded (P/N 417 223 038)	146" track: hollow/threaded (P/N 417 222 707) 154" Powder Max: hollow/threaded (P/N 417 223 035) 154" track (EUR): solid (P/N 417 222 594) 163" track: hollow/threaded (P/N 417 223 038)
	Ramp		413	
	Screw position		1	1 154" track (EUR): 3
Driven pulley type	Type		QRS	
	Spring color		Purple	
	Spring preload		0	
	Cam angle		42°	
Pulley distance	Z	mm (in)	Not adjustable 21.2 (.835)	
Offset	X	mm (in)	Not adjustable 37.15 (1.463)	
Drive belt part number		P/N	417 300 166	
Drive belt	Width	mm (in)	37.7 (1.484)	
	Wear limit	mm (in)	35.3 (1.390)	
Drive belt adjustment	Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
	Force	kgf (lbf)	11.30 (24.91)	
Track	Width	mm (in)	406.4 (16)	
	Length	m (in)	146" track: 3.71 (146) 154" track: 3.92 (154)	146" track: 3.71 (146) 154" track: 3.92 (154) 163" track: 4.14 (163)
	Profile height	mm (in)	58.7 (2.31)	57.2 (2.25) Powder Max: 58.7 (2.31)
Track adjustment	Deflection	mm (in)	30 to 35 (1.181 to 1.378)	
	Force	kgf (lbf)	7.3 (16)	

MODEL			SUMMIT 800R POWER TEK	
			EVEREST	X
BRAKE SYSTEM				
Brake lining minimum thickness		mm (in)	1 (.039)	
Brake disk minimum thickness		mm (in	4.5 (.177)	
Brake fluid	Type		DOT 4	
	Quantity	mL (U.S. oz)	60 (2.0)	
SUSPENSION				
FRONT				
Suspension type			REV-XP	
Suspension maximum travel		mm (in)	229 (9)	
Shock absorber type			H.P.G.	H.P.G. T/A (aluminum)
Sway bar type			Link	
REAR				
Suspension type			SC-5M	
Suspension maximum travel		mm (in)	146" track: 356 (14) 154" track: 381 (15)	146" track: 356 (14) 154" track: 381 (15) 163" track: 406 (16)
Shock absorber type	Center		H.P.G.	H.P.G. T/A (aluminum)
	Rear		H.P.G.	H.P.G. T/A (aluminum)
Stroke limiter standard position			2	
STEERING SYSTEM				
Ski type			Pilot 6.9	
Toe-out		mm (in)	0 (0)	
Camber			0°	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	146" track: 197 (435) 154" track: 199 (439)	146" track: 193 (425) 154" track: 195 (429) 163" track: 197 (434)
Length		m (in)	146" track: 3.2 (126) 154" track: 3.31 (130.3)	146" track: 3.2 (126) 154" track: 3.31 (130.3) 163" track: 3.42 (134.6)
Width		m (in)	1.20 (47)	
Height		m (in)	1.17 (46)	1 (39.4)
Ski stance (carbide to carbide)		m (in)	0.99 (39)	
MATERIAL				
Frame			Aluminum	
Bottom pan and side panels			Polypropylene	
Hood			Surlyn	

600 HO SDI MODELS

MODEL			GSX 600 HO SDI	
			LIMITED	LIMITED TOURING
ENGINE				
Engine type			593 HO	
Number of cylinders			2	
Bore		mm (in)	72 (2.835)	
Stroke		mm (in)	73 (2.874)	
Displacement		cm³ (in³)	594.40 (36.273)	
Compression ratio			12.25 ± 0.5	
Maximum power engine speed		± 100 RPM	8100	
Combustion chamber volume		cc	25.30 to 27.60	
RAVE spring	Color		Black	
	Wire diameter	mm (in)	0.80 (0.031)	
	Minimum free length	mm (in)	42.5 (1.673)	
Piston ring type			Semi-trapezoidal	
Ring end gap	New	mm (in)	0.40 to 0.55 (.016 to .022)	
	Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance	New	mm (in)	0.05 to 0.1 (.0020 to .0039)	
	Wear limit	mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance	New	mm (in)	0.110 ± 0.010 (.0043 ± .0004)	
	Wear limit	mm (in)	0.18 (.0071)	
Piston skirt wear	Wear limit	mm (in)	0.15 (.006)	
Cylinder head warpage	Wear limit	mm (in)	0.5 (.02)	
Cylinder taper	New (max.)	mm (in)	0.05 (.0020)	
	Wear limit	mm (in)	0.1 (.0039)	
Cylinder out of round	New (max.)	mm (in)	0.010 (.0004)	
	Wear limit	mm (in)	0.08 (.0031)	
Maximum crankshaft end play	New (max.)	mm (in)	0.3 (.012)	
Maximum crankshaft deflection	Wear limit	mm (in)	MAG: 0.05 (.0020) PTO: 0.06 (.0024)	
Connecting rod big end axial play	New	mm (in)	0.310 to 0.680 (.0122 to .0268)	
	Wear limit	mm (in)	1.2 (.0472)	
COOLING SYSTEM				
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use premix coolant from BRP (P/N 219 700 362) or coolant specifically formulated for aluminum engines	
	Quantity	L (U.S. gal.)	5.6 (1.48)	
Thermostat opening temperature		°C (°F)	37 (98.6)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	

MODEL		**GSX 600 HO SDI**	
		LIMITED	**LIMITED TOURING**
LUBRICATION SYSTEM			
Injection oil	Type	XP-S 2-stroke synthetic blend	
	Quantity L (U.S. oz)	3.7 (125.1)	
FUEL SYSTEM			
Throttle body type		Dell'Orto	
Idle speed ± 200 RPM		1700	
Gas type		Unleaded	
Pump octane number	Inside North America ((R+M)/2)	87 or higher	
	Outside North America (RON)	92 or higher	
Fuel tank capacity L (U.S. gal)		40 (10.6)	
Gas/oil ratio		Injection	
ELECTRICAL SYSTEM			
Magneto generator output W		470 @ 6000 RPM	
Ignition type		Inductive	
Spark plug	Make and type	NGK BR8ECS	
	Gap mm (in)	Not adjustable 0.70 to 0.80 (.028 to .032)	
Ignition timing BTDC mm (in)		5.39 (.212) @ 4000 RPM	
Trigger coil Ω		190 to 290	
Lighting coil Ω		0.1 to 1.0	
Battery		12 V, 18 A•h	
Headlamp W		2 x 60/55 (H4)	
Taillight and stoplight W		5/21	
Fuse	Outer injectors (F1) A	5	
	Inner injectors (F2) A	5	
	ECM (F3) A	5	
	Gauge multifunction display (F4) A	7.5	
	Fuel pump/ignition coils (F5) A	10	
	Accessories/tail lamp (F6) A	15	
	Headlamp (F7) A	15	
	Capacitor (F8) A	20	
	Relays/start button (F9) A	5	
	Charging system A	30	

MODEL		GSX 600 HO SDI	
		LIMITED	**LIMITED TOURING**
DRIVE SYSTEM			
Chaincase oil	Type	XP-S synthetic chaincase oil	
	Quantity mL (U.S. oz)	250 (8.5)	
Chain drive ratio		25/45	
Chain	Pitch in	3/8	
	Type/links qty/plate qty	Silent 104/13	
Drive pulley type		TRA III	
Drive pulley calibration	Clutch engagement ± 100 RPM	3600	
	Spring color	Purple/Purple	
	Spring length mm (in)	106.98 (4.212)	
	Pin	Solid (P/N 417 004 308)	
	Ramp	414	
	Screw position	3	
Driven pulley type	Type	QRS	
	Spring color	Black	
	Spring preload	0	
	Cam angle	42°/40°	
Pulley distance	Z mm (in)	Not adjustable 21.2 (.835)	
Offset	X mm (in)	Not adjustable 37.15 (1.463)	
Drive belt part number	P/N	417 300 197	
Drive belt	Width mm (in)	37.3 (1.469)	
	Wear limit mm (in)	34.9 (1.374)	
Drive belt adjustment	Deflection mm (in)	32 ± 5 (1.260 ± .197)	
	Force kgf (lbf)	11.30 (24.91)	
Track	Width mm (in)	381 (15)	
	Length m (in)	3.05 (120)	
	Profile height mm (in)	25.4 (1.0)	
Track adjustment	Deflection mm (in)	30 to 35 (1.181 to 1.378)	
	Force kgf (lbf)	7.3 (16)	
BRAKE SYSTEM			
Brake lining minimum thickness	mm (in)	1 (.039)	
Brake disk minimum thickness	mm (in)	4.5 (.177)	
Brake fluid	Type	DOT 4	
	Quantity mL (U.S. oz)	60 (2.0)	

MODEL			GSX 600 HO SDI	
			LIMITED	LIMITED TOURING
SUSPENSION				
FRONT				
Suspension type			REV-XP	
Suspension maximum travel		mm (in)	229 (9)	
Shock absorber type			H.P.G.	
Sway bar type			Link	
REAR				
Suspension type			SC-5	
Suspension maximum travel		mm (in)	381 (15)	
Shock absorber type	Center		H.P.G.	
	Rear		H.P.G. VR	
Stroke limiter standard position			3	4
STEERING SYSTEM				
Ski type			Pilot 5.7	
Toe-out		mm (in)	0 (0)	
Camber			0°	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	203 (448)	215 (475)
Length		m (in)	2.89 (113.8)	
Width		m (in)	1.22 (47.9)	
Height		m (in)	1.21 (47.7)	
Ski stance (carbide to carbide)		m (in)	1.07 (42)	
MATERIAL				
Frame			Aluminum	
Bottom pan and side panels			Polypropylene	
Hood			Surlyn	

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MODEL			MX Z 600 HO SDI			
			ADRENALINE	**RENEGADE**	**RENEGADE X**	**X**
ENGINE						
Engine type			593 HO			
Number of cylinders			2			
Bore		mm (in)	72 (2.835)			
Stroke		mm (in)	73 (2.874)			
Displacement		cm³ (in³)	594.40 (36.273)			
Compression ratio			12.25 ± 0.5			
Maximum power engine speed		± 100 RPM	8100			
Combustion chamber volume		cc	25.30 to 27.60			
RAVE spring	Color		Black			
	Wire diameter	mm (in)	0.80 (0.031)			
	Minimum free length	mm (in)	42.5 (1.673)			
Piston ring type			Semi-trapezoidal			
Ring end gap	New	mm (in)	0.40 to 0.55 (.016 to .022)			
	Wear limit	mm (in)	1.0 (.039)			
Ring/piston groove clearance	New	mm (in)	0.05 to 0.1 (.0020 to .0039)			
	Wear limit	mm (in)	0.2 (.0079)			
Piston/cylinder wall clearance	New	mm (in)	0.110 ± 0.010 (.0043 ± .0004)			
	Wear limit	mm (in)	0.18 (.0071)			
Piston skirt wear	Wear limit	mm (in)	0.15 (.006)			
Cylinder head warpage	Wear limit	mm (in)	0.5 (.02)			
Cylinder taper	New (max.)	mm (in)	0.05 (.0020)			
	Wear limit	mm (in)	0.1 (.0039)			
Cylinder out of round	New (max.)	mm (in)	0.010 (.0004)			
	Wear limit	mm (in)	0.08 (.0031)			
Maximum crankshaft end play	New (max.)	mm (in)	0.3 (.012)			
Maximum crankshaft deflection	Wear limit	mm (in)	MAG: 0.05 (.0020) PTO: 0.06 (.0024)			
Connecting rod big end axial play	New	mm (in)	0.310 to 0.680 (.0122 to .0268)			
	Wear limit	mm (in)	1.2 (.0472)			
COOLING SYSTEM						
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use premix coolant from BRP (P/N 219 700 362) or coolant specifically formulated for aluminum engines			
	Quantity	L (U.S. gal.)	5.6 (1.48)	6 (1.59)		5.6 (1.48)
Thermostat opening temperature		°C (°F)	37 (98.6)			
Radiator cap opening pressure		kPa (PSI)	90 (13)			

MODEL		MX Z 600 HO SDI			
		ADRENALINE	RENEGADE	RENEGADE X	X
LUBRICATION SYSTEM					
Injection oil	Type	XP-S 2-stroke synthetic blend			
	Quantity L (U.S. oz)	3.7 (125.1)			
FUEL SYSTEM					
Throttle body type		Dell'Orto			
Idle speed ± 200 RPM		1700			
Gas type		Unleaded			
Pump octane number	Inside North America ((R+M)/2)	87 or higher			
	Outside North America (RON)	92 or higher			
Fuel tank capacity L (U.S. gal)		40 (10.6)			
Gas/oil ratio		Injection			
ELECTRICAL SYSTEM					
Magneto generator output W		470 @ 6000 RPM			
Ignition type		Inductive			
Spark plug	Make and type	NGK BR8ECS			
	Gap mm (in)	Not adjustable 0.70 to 0.80 (.028 to .032)			
Ignition timing BTDC mm (in)		5.39 (.212) @ 4000 RPM			
Trigger coil Ω		190 to 290			
Lighting coil Ω		0.1 to 1.0			
Battery		12 V, 18 A•h (with electric starter) 12 V, 3 A•h (without electric starter)			
Headlamp W		2 x 60/55 (H4)			
Taillight and stoplight W		5/21			
Fuse	Outer injectors (F1) A	5			
	Inner injectors (F2) A	5			
	ECM (F3) A	5			
	Gauge multifunction display (F4) A	7.5			
	Fuel pump/ignition coils (F5) A	10			
	Accessories/tail lamp (F6) A	15			
	Headlamp (F7) A	15			
	Capacitor (F8) A	20			
	Relays/start button (F9) A	5			
	Charging system A	30 (with electric starter)			

MODEL		**MX Z 600 HO SDI**			
		ADRENALINE	**RENEGADE**	**RENEGADE X**	**X**
DRIVE SYSTEM					
Chaincase oil	Type	XP-S synthetic chaincase oil			
	Quantity mL (U.S. oz)	250 (8.5)			
Chain drive ratio		25/45	22/45	22/45 1.75" track: 21/45	25/45
Chain	Pitch in	3/8			
	Type/links qty/plate qty	Chain drive ratio (21/45): Silent 102/13 Others: Silent 104/13			
Drive pulley type		TRA III			
Drive pulley calibration	Clutch engagement ± 100 RPM	3600			
	Spring color	Purple/Purple			
	Spring length mm (in)	106.98 (4.212)			
	Pin	Solid (P/N 417 004 308)			
	Ramp	414			
	Screw position	3			
Driven pulley type	Type	QRS			
	Spring color	Black			
	Spring preload	0			
	Cam angle	42°/40°	40°		42°/40°
Pulley distance	Z mm (in)	Not adjustable 21.2 (.835)			
Offset	X mm (in)	Not adjustable 37.15 (1.463)			
Drive belt part number	P/N	417 300 197			
Drive belt	Width mm (in)	37.3 (1.469)			
	Wear limit mm (in)	34.9 (1.374)			
Drive belt adjustment	Deflection mm (in)	32 ± 5 (1.260 ± .197)			
	Force kgf (lbf)	11.30 (24.91)			
Track	Width mm (in)	381 (15)	406 (16)		381 (15)
	Length m (in)	3.05 (120)	3.49 (137)		3.05 (120)
	Profile height mm (in)	25.4 (1.0)	31.8 (1.25)		
Track adjustment	Deflection mm (in)	30 to 35 (1.181 to 1.378)			
	Force kgf (lbf)	7.3 (16)			
BRAKE SYSTEM					
Brake lining minimum thickness	mm (in)	1 (.039)			
Brake disk minimum thickness	mm (in)	4.5 (.177)			
Brake fluid	Type	DOT 4			
	Quantity mL (U.S. oz)	60 (2.0)			

MODEL		MX Z 600 HO SDI			
		ADRENALINE	**RENEGADE**	**RENEGADE X**	**X**
SUSPENSION					
FRONT					
Suspension type		REV-XP			
Suspension maximum travel	mm (in)	229 (9)			
Shock absorber type		H.P.G.		H.P.G. clicker T/A EUR: H.P.G. clicker T/A (aluminum)	
Sway bar type		Link			
REAR					
Suspension type		SC-5			
Suspension maximum travel	mm (in)	381 (15)	406 (16)		381 (15)
Shock absorber type	Center	H.P.G.		H.P.G. T/A (aluminum)	
	Rear	H.P.G.		H.P.G. racing clicker (aluminum)	
Stroke limiter standard position		3			
STEERING SYSTEM					
Ski type		Pilot 5.7			
Toe-out	mm (in)	0 (0)			
Camber		0°			
VEHICLE INFORMATIONS					
Mass (dry)	kg (lb)	194 (428)	199 (438)	195 (430)	190 (418)
Length	m (in)	2.89 (113.8)	3.11 (122.4) EUR: 3.18 (125)		2.89 (113.8)
Width	m (in)	1.22 (47.9)	1.22 (47.9) EUR: 1.25 (49)		1.22 (47.9)
Height	m (in)	1.17 (46)		1 (39.4)	
Ski stance (carbide to carbide)	m (in)	1.07 (42)			
MATERIAL					
Frame		Aluminum			
Bottom pan and side panels		Polypropylene			
Hood		Surlyn			

ELECTRICAL CONNECTORS

SERVICE TOOLS

Description	Part Number	Page
crimp pliers	529 035 730	533
crimper die	529 035 906	531
connector crimping tool	529 035 909	531

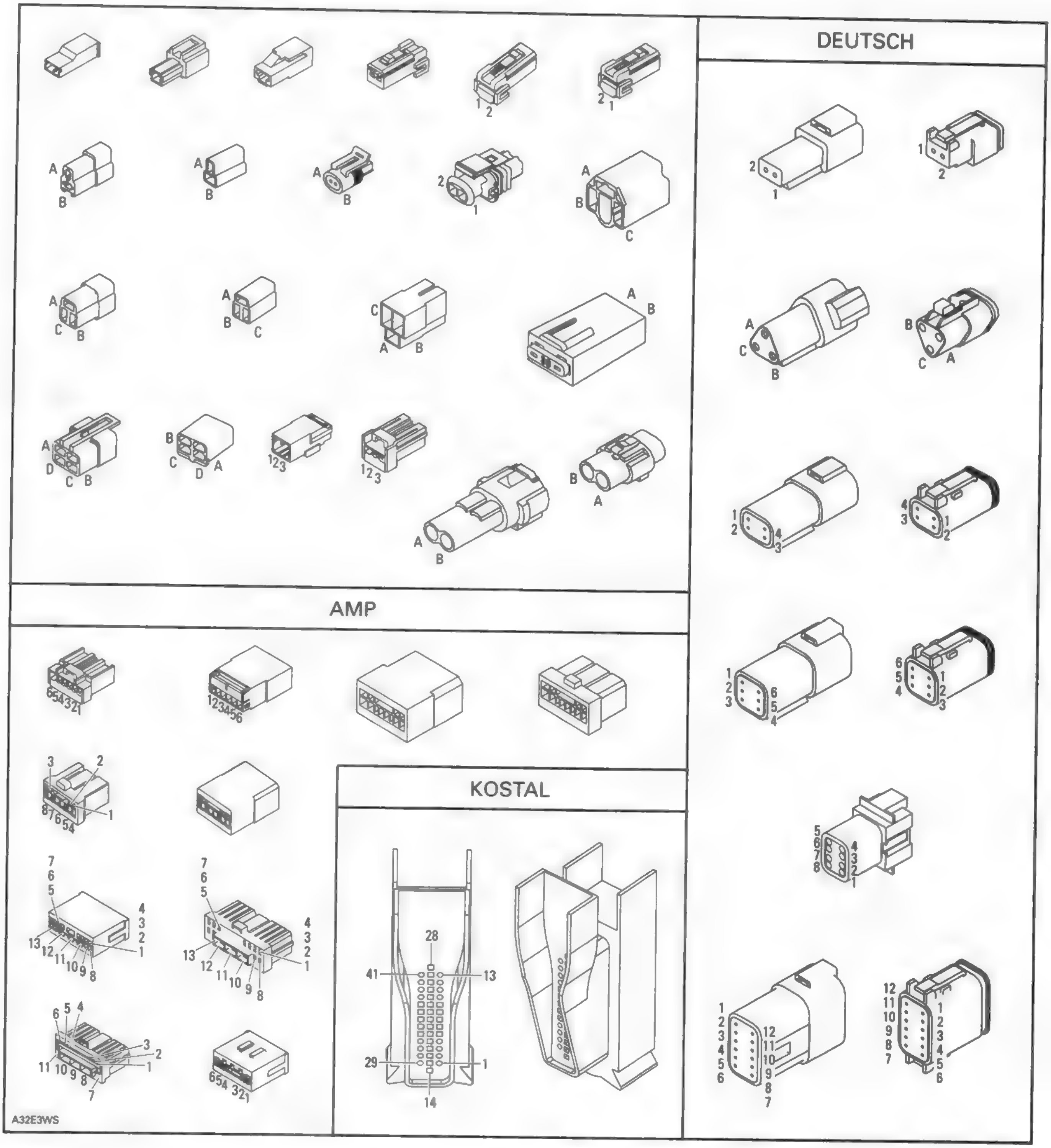
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
tool	AMP-755430-2	528–529
Snap-on screwdriver	TT600-5	525–526

SERVICE PRODUCTS

Description	Part Number	Page
dielectric grease	293 550 004	528

CONNECTOR TYPES


DEUTSCH
AMP
KOSTAL
A B C D
1 2 3 4 5 6 7 8 9 10 11 12 13
28
41
13
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14
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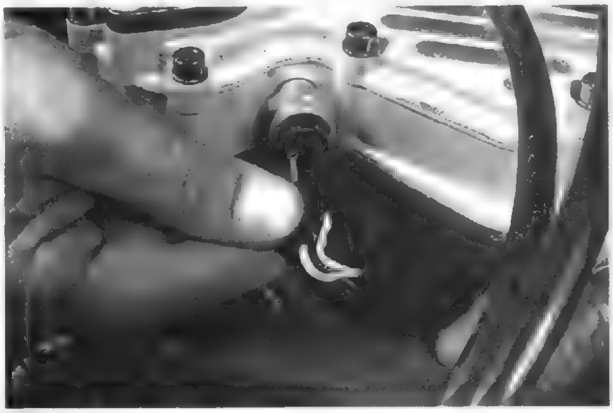
PROCEDURES

TAB AND RECEPTACLE CONNECTORS

Disconnecting the Connector

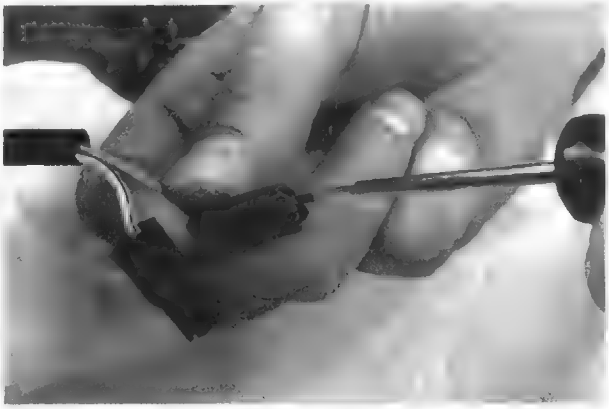
Always unplug connectors by pulling on housing not on wire.



TYPICAL

Connector Disassembly

Insert Snap-on screwdriver (P/N TT600-5) in access opening then pull housing toward wire side.

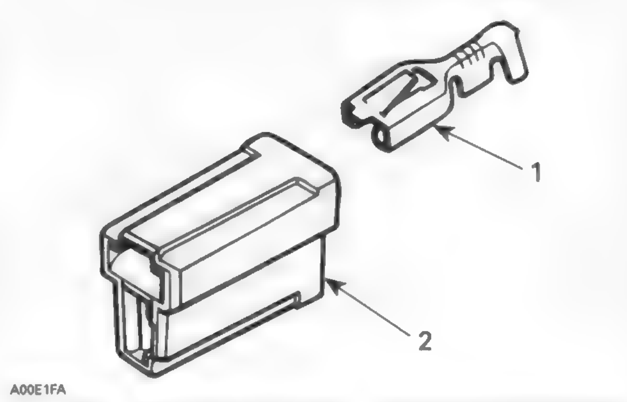


TYPICAL — RECEPTACLE CONNECTOR

Connector Assembly

Prior to installing, make sure locking tab is sufficiently lifted to properly lock.

Insert tab and receptacle connectors in their respective housings as shown in following illustrations. Push sufficiently so that they snap. Try pulling wire to ensure they are properly locked.



TYPICAL
1. Receptacle
2. Housing

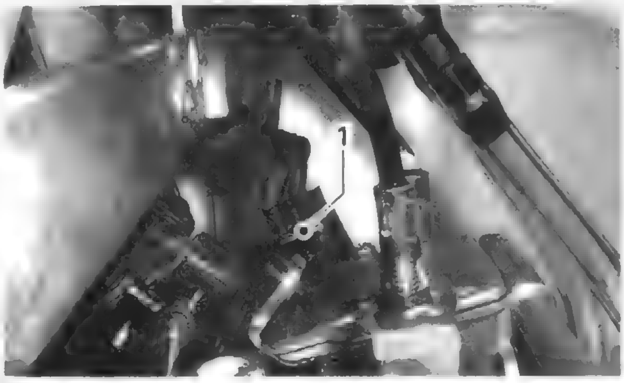
⚠ WARNING

Keep wires away from any rotating, moving, heating, vibrating or sharp edge. Use proper fastening devices as required.

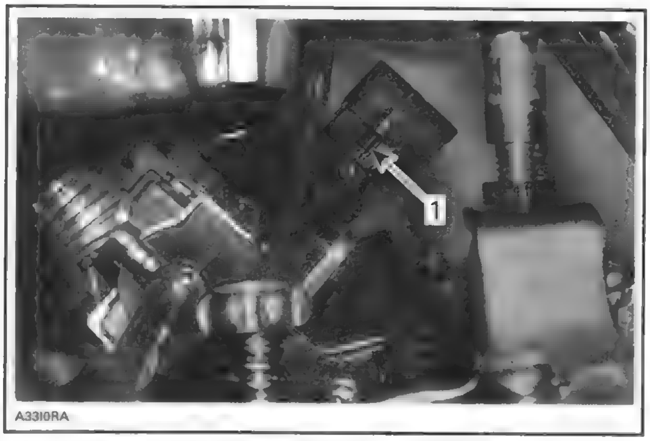
SUMITOMO CONNECTOR

Disconnecting the Connector

To disconnect the Sumitomo TPS connector from carburetor or throttle body, press the release button on the other side of the connector.



TPS CONNECTOR
1. Release button



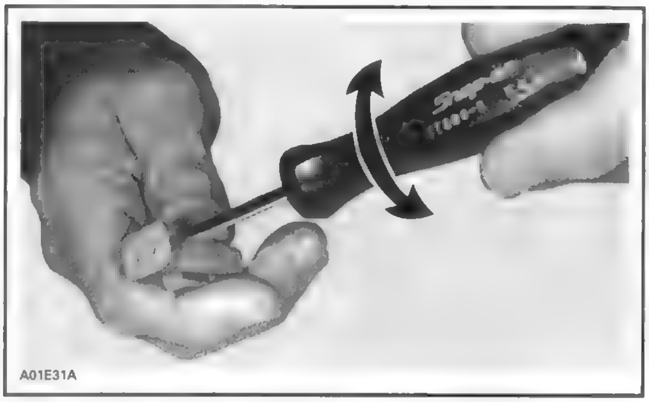
TPS CONNECTOR (UNPLUGGED)
1. Release button

DEUTSCH CONNECTORS

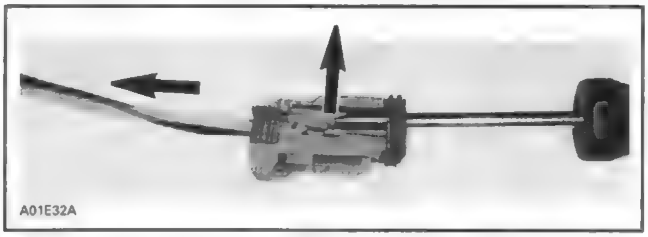
Connector Disassembly

Male Housing

Insert Snap-on screwdriver (P/N TT600-5) under lock and twist to lift it.



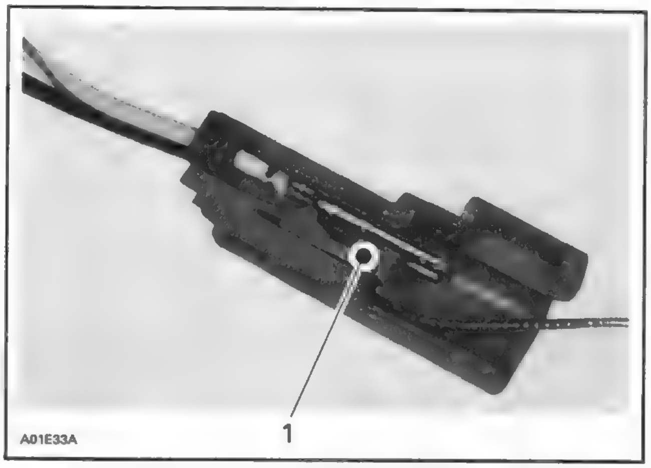
Pry tab to free connector then pull wire out of housing.



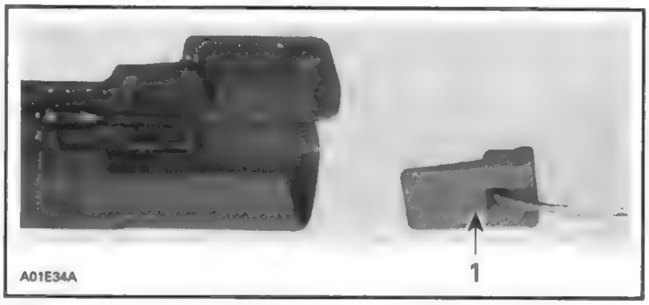
FEMALE CONNECTOR HOUSING — CUT-AWAY

Female Housing

Using a small hook, pull out the lock.

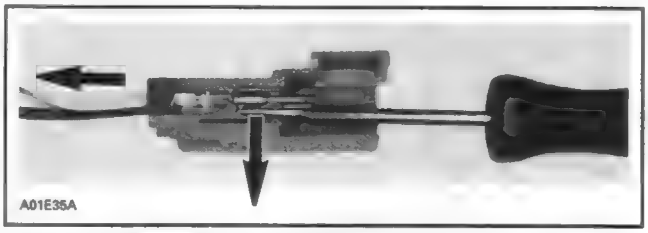


1. Lock



1. Lock

Pry tab to free connector then pull wire out of housing.

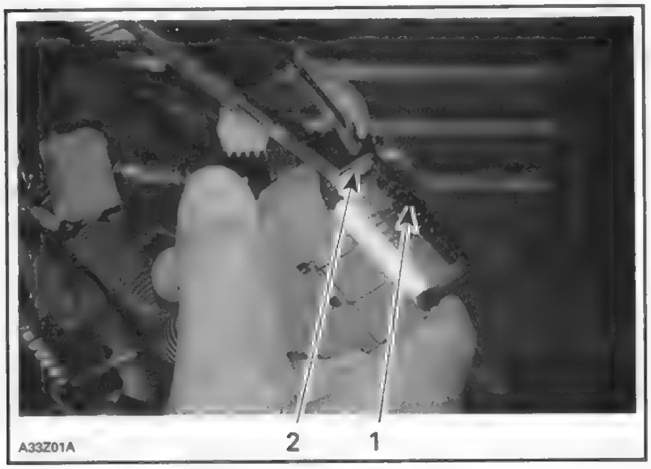


FEMALE HOUSING — CUT-AWAY

PACKARD CONNECTOR

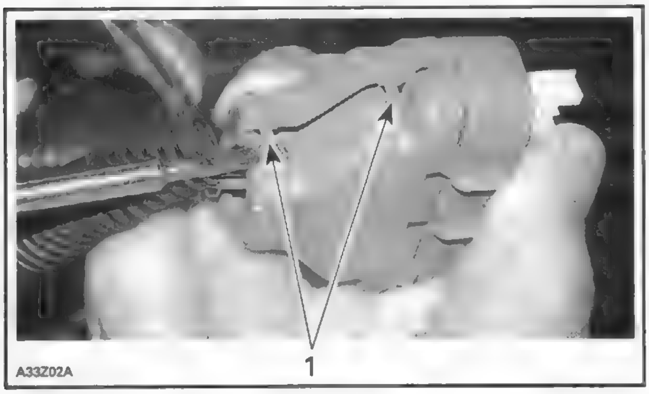
Connector Disassembly

Push on both tabs to remove retainer.



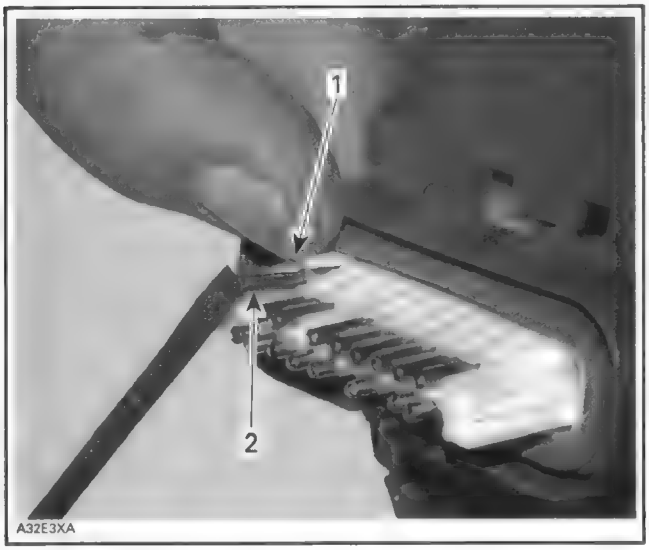
1. Retainer
2. Tab (one on each side)

Open housing by lifting 4 tabs.



1. Tabs (2 on each side)

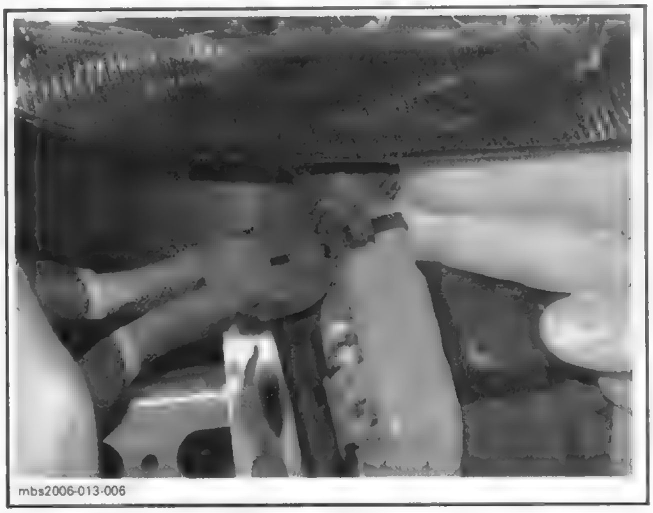
Lift the top plastic lock of the female terminal to be removed and hold in position. Lift the female terminal to unlock from the housing and push out of housing.



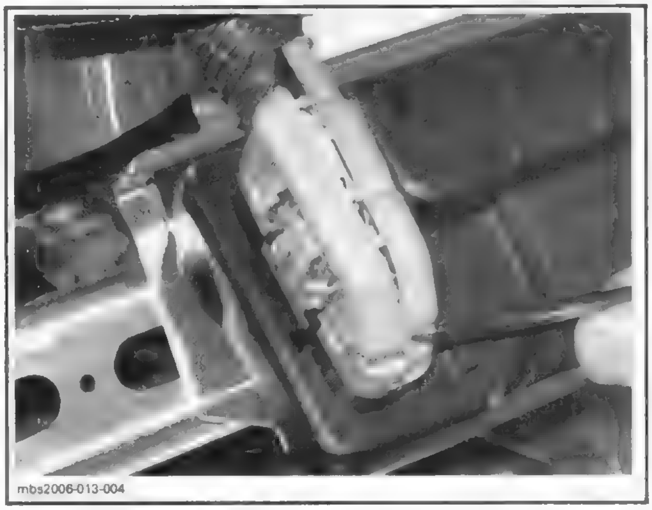
1. Lift and hold plastic lock
2. Lift to unlock and push out

Connector Corrosion Protection (ECM)

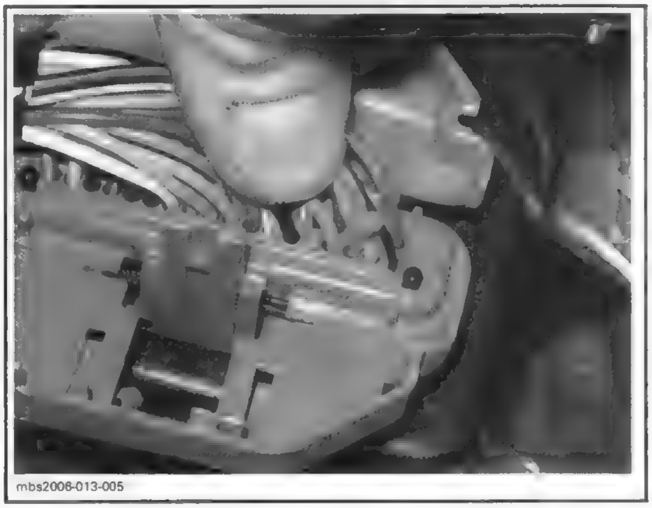
Cut the tie rap over the ECM connector.


mbs2006-013-006

Open the 3 tabs to open the connector.


mbs2006-013-004

Remove at least 2 blue plug pins of the connector (keep them).


mbs2006-013-005

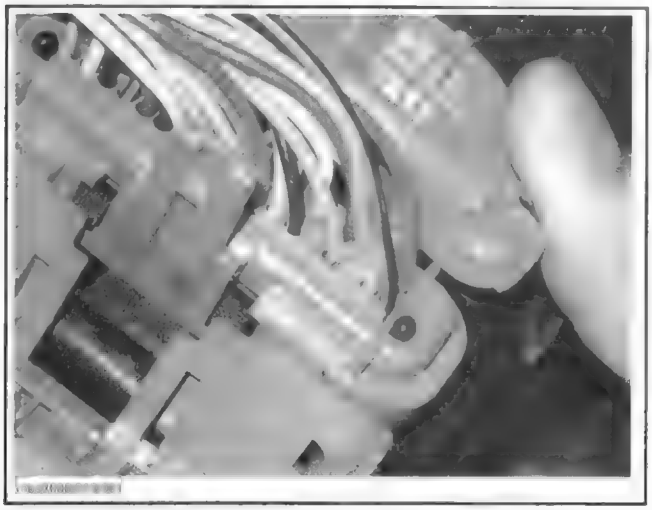
Unplug the connector from the ECM.

NOTE: Any corrosion should be carefully cleaned with a soft brass brush.

Fill the ECM socket with a generous quantity of dielectric grease (P/N 293 550 004).

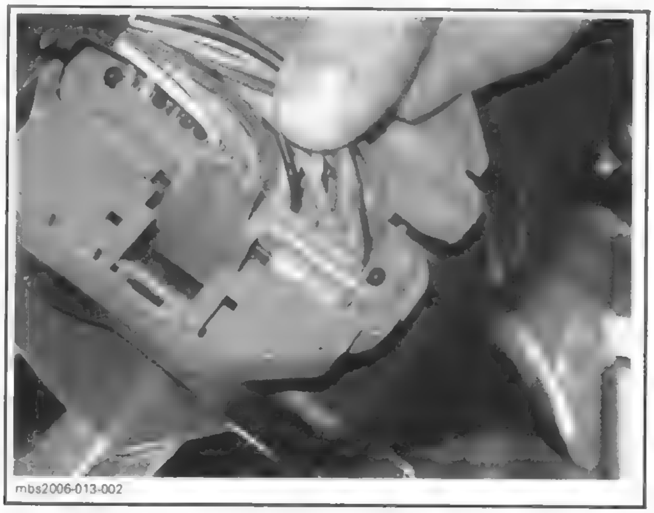
mbs2006-013-003

SLOWLY reinstall the connector and make sure some grease come out by both holes previously opened (blue pin).



Reinstall both blue pins.

Close the connector.

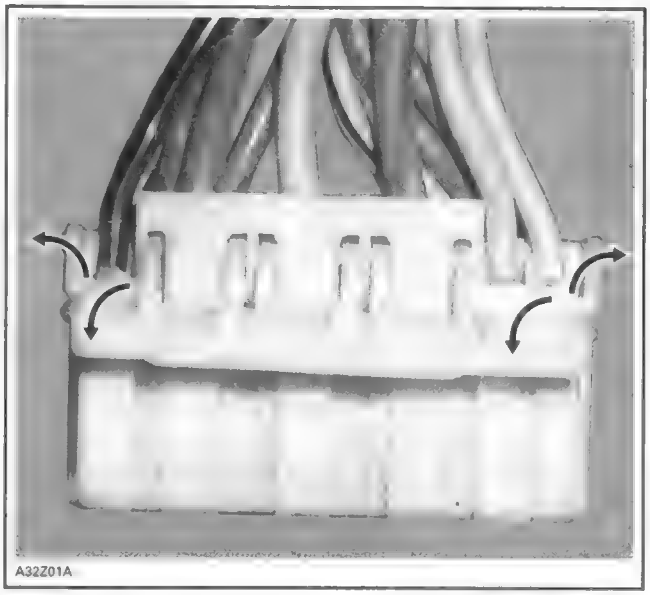


Reinstall a new tie rap on ECM connector.

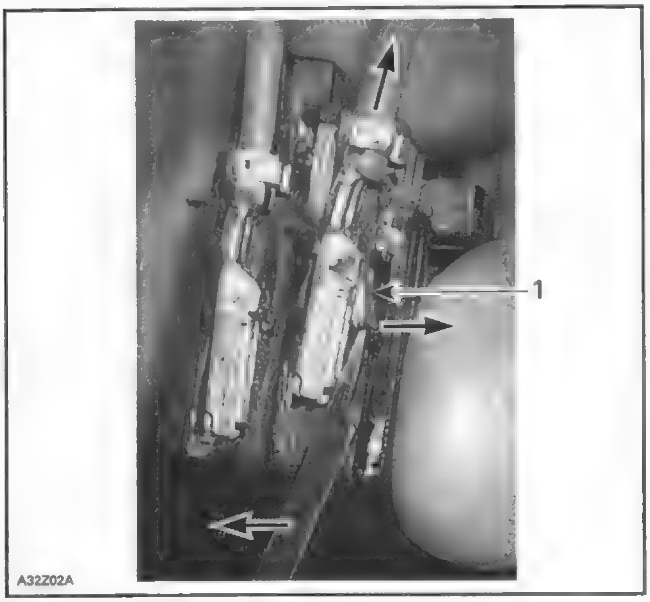
AMP MULTILOCK CONNECTOR

Connector Disassembly

Male Housing



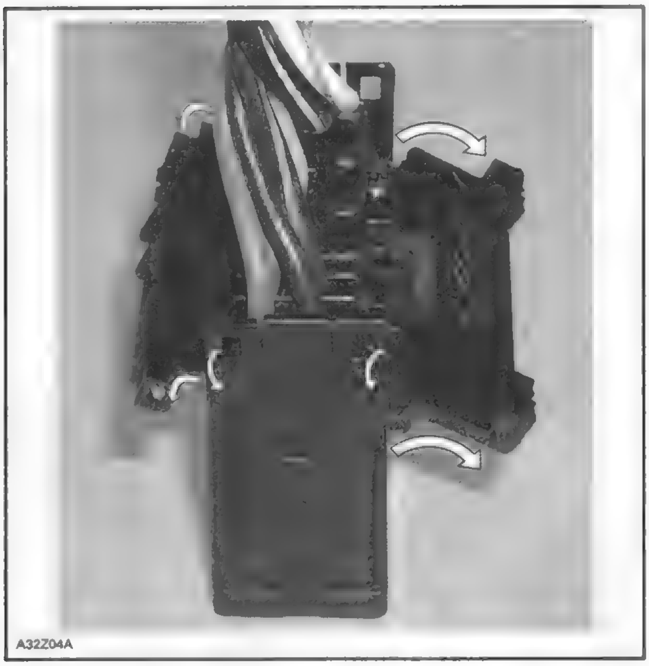
Insert tool (P/N AMP-755430-2) under lock and twist to lift it.



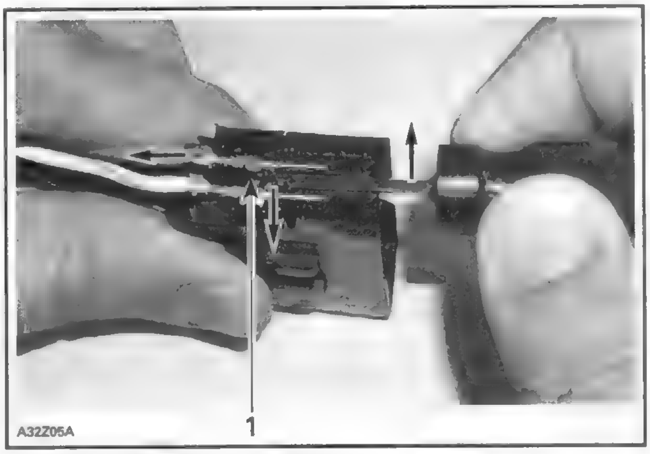
MALE HOUSING — CUT-AWAY
1. Lock

Female terminals can be removed from housing with sharp head pin.

Female Housing



Insert tool (P/N AMP-755430-2) under lock and twist to lift it.



FEMALE HOUSING — CUT-AWAY
1. Lock

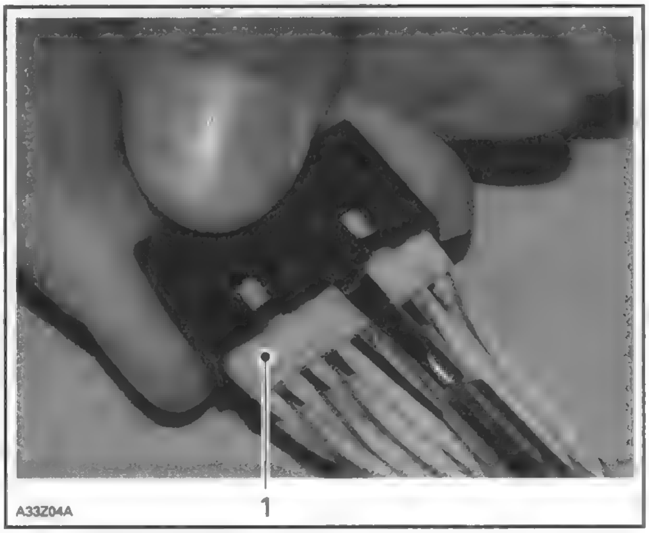
Terminal Crimping

Refer to *KOSTAL ECM CONNECTOR "A" AND "B"* for procedure.

AMP CONNECTOR (8-CIRCUIT)

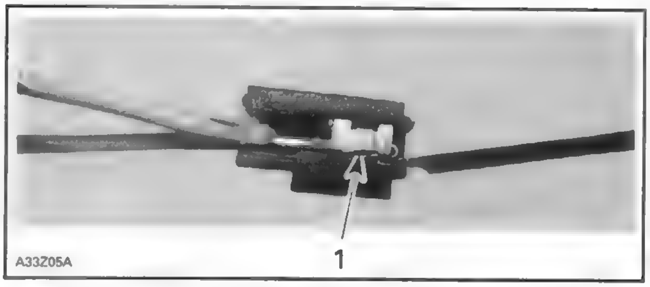
Connector Disassembly

Pry housing to release lock.



1. Lock

Insert tool (P/N AMP-755430-2) under tab and pry it to free connector. Pull on the female terminal wire to remove female terminal from housing.



AMP 8-CIRCUIT CONNECTOR — CUT-AWAY
1. Tab

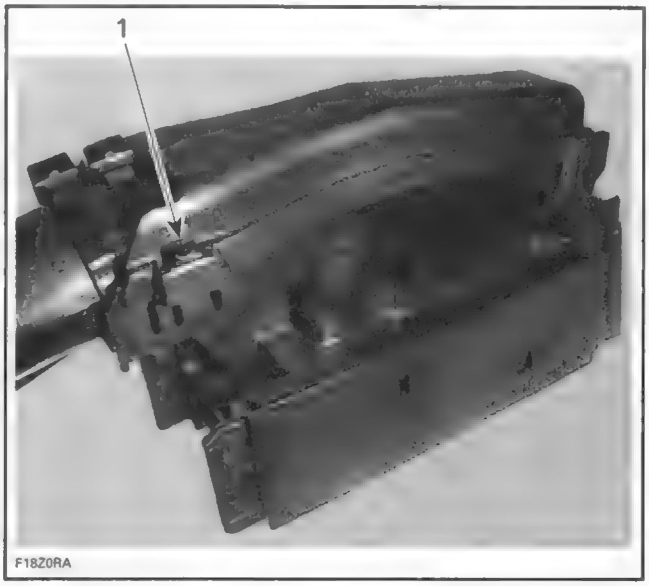
Terminal Crimping

Refer to *KOSTAL ECM CONNECTOR "A" AND "B"* for procedure.

KOSTAL CONNECTORS (ECM)

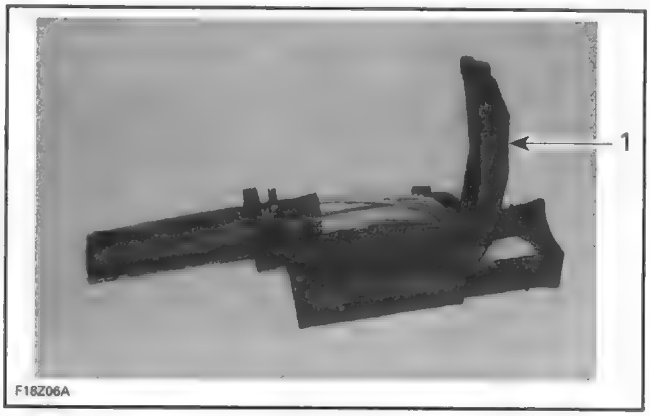
Terminal Removal

Unlock the connector housing cover by pushing in the tabs on top of the housing with a flat screwdriver to be able to flip the top cover up.



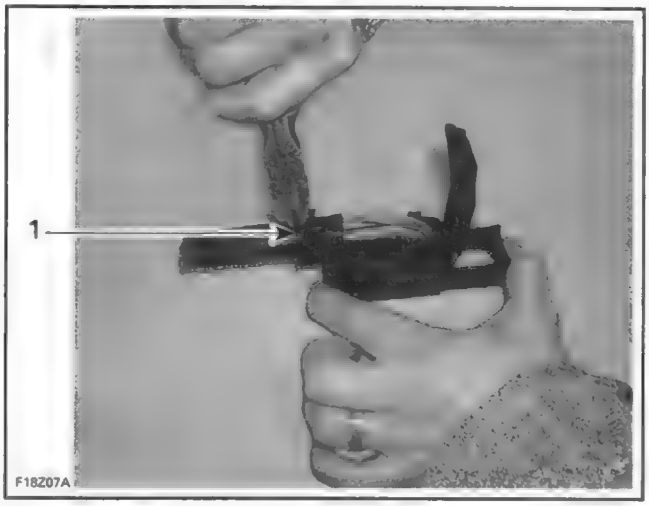
1. Push in tab

Lift the cover by pushing it forward.



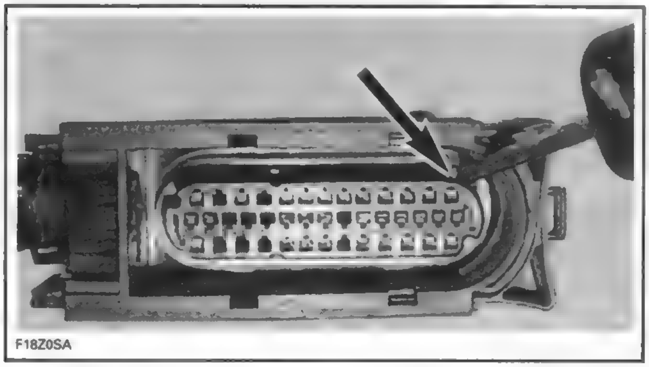
1. Cover

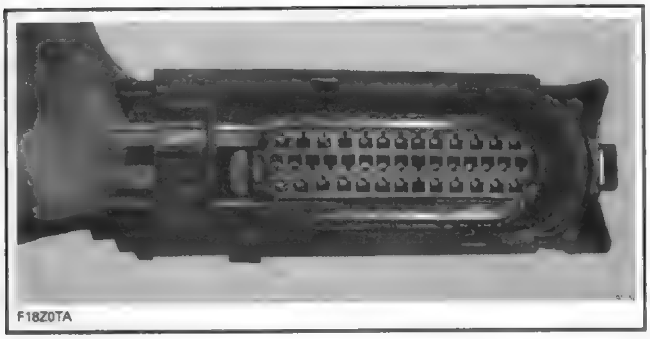
Cut both locking ties that secure the harness to the housing.



1. Locking ties

Turn the housing over and remove the lock by pushing and then pulling toward the wire harness.



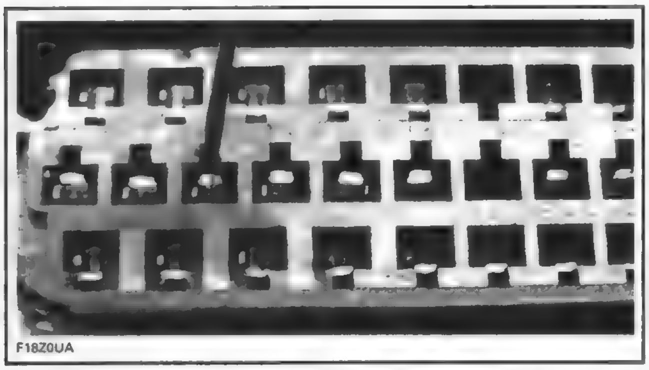


F18Z0TA

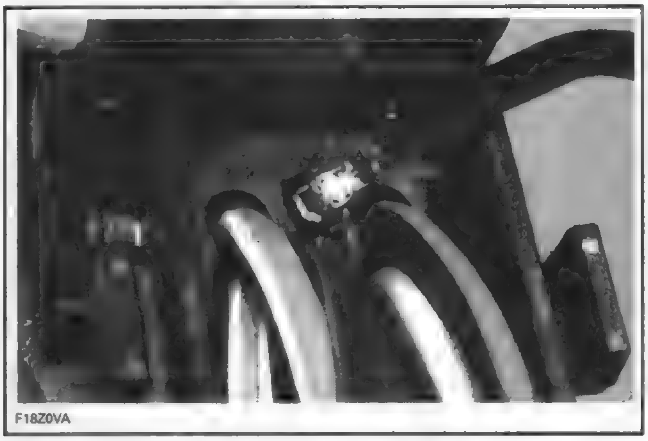
Use a 0.76 mm (.030 in) oxyacetylene torch tip cleaner or a no. 68 drill bit inserted down into the housing to release the locking tab on the connector.

CAUTION: Using a probe larger than 0.76 mm (.030 in) may damage the terminal.

Insert the probe into the housing as shown, and locate the appropriate wire in the back of the housing. You may have to slightly cam the probe against the locking tab to release it, then remove the terminal from the housing.



F18Z0UA



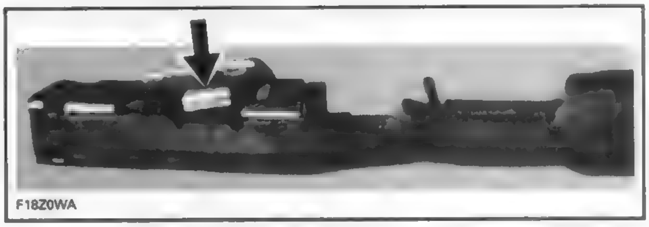
F18Z0VA

If the wire is in good condition but the terminal is rusted or corroded, remove defective terminal and crimp a new one. If wire and terminal are defective, acquire a new genuine wire and new terminal and crimp them together as explained below.

IMPORTANT: Use genuine wires only. Otherwise wires will not fit properly.

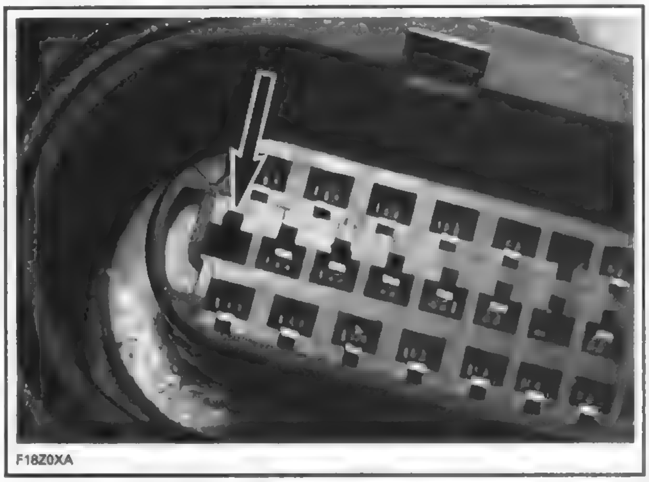
Terminal Installation

The locking tab on the connector may have to be bent out a little so it will lock in the housing when it's re-inserted.



F18Z0WA

When re-inserting the connector, the locking tab must be installed facing the smaller cutout of the connector cavity.



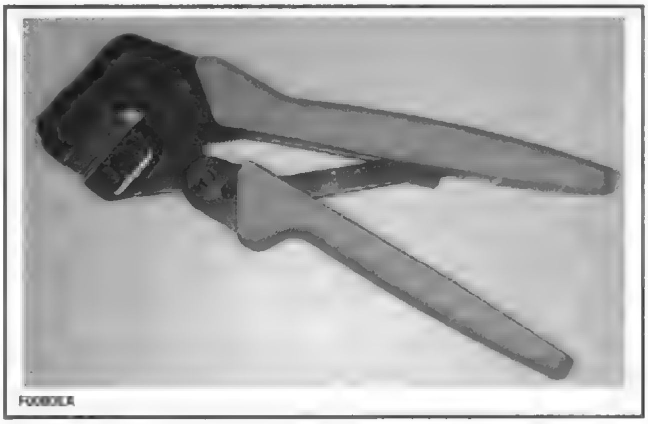
F18Z0XA

Insert the terminal, ensuring the locking tab snaps into the housing.

Re-install the lock, attach the 2 tie raps, and close the housing cover.

Terminal Crimping (Kostal and AMP Multilock)

To crimp a new connector terminal, use the connector crimping tool (P/N 529 035 909) and the crimper die (P/N 529 035 906).

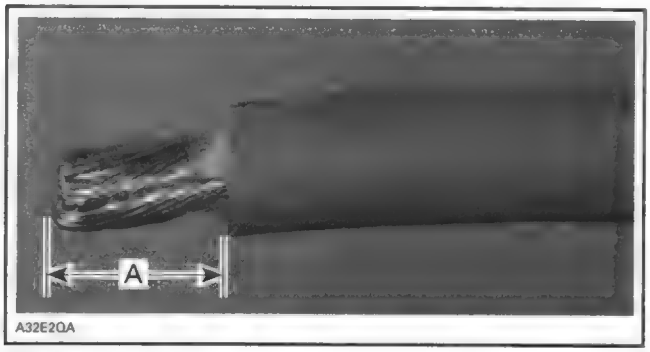


[illegible]

CRIMPING TOOL

To properly crimp the wires, strictly follow this procedure.

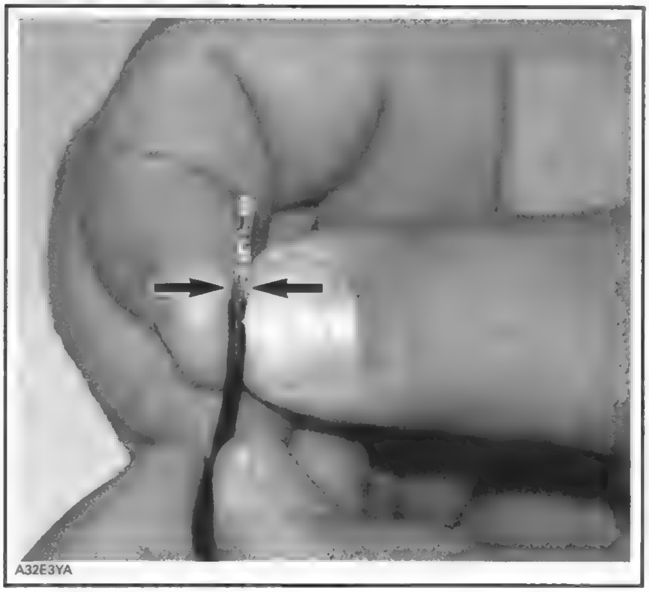
Strip the wire to a maximum of 3 mm (1/8 in).



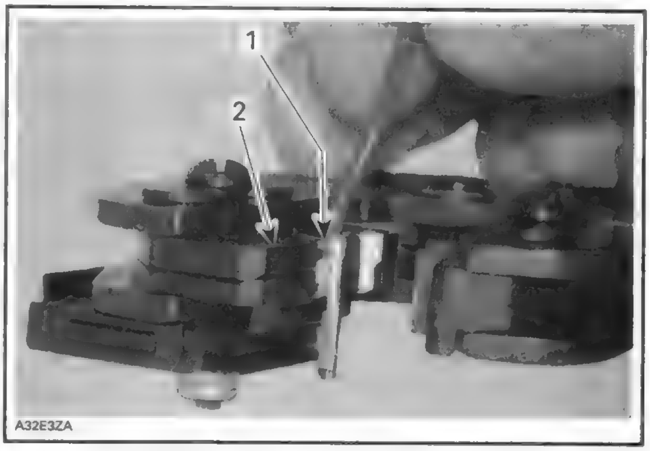
TYPICAL
A. 3 mm (1/8 in) max.

Position wire in terminal.

Squeeze the terminal tabs with your fingers to temporarily retain terminal in place.



Insert terminal with wire in crimping pliers and position so that top of terminal tabs are flush with pliers edge or a little bit lower as shown.



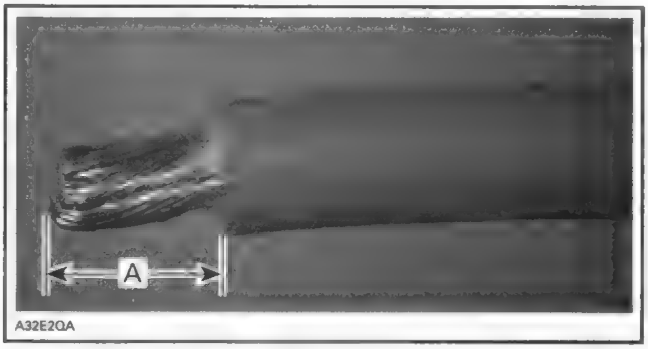
1. *Top of terminal tabs*
2. *Align tabs with pliers edge*

Crimp terminal. Ensure no tiny wire goes out of terminal. This might cause strange problems of the electrical system.

BATTERY CABLE TERMINAL

Terminal Installation

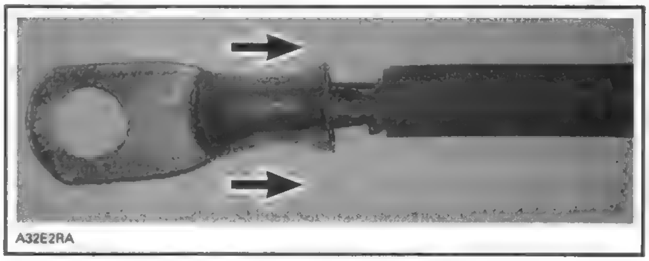
Carefully strip the wire approximately to 10 mm (1/2 in) in length, using a wire stripping tool or sharp blade/knife.



A. 10 mm (1/2 in)

NOTE: Make sure not to cut wire strands while stripping the wire.

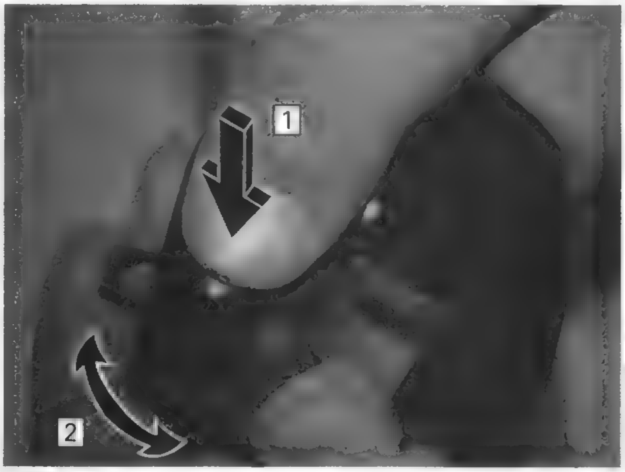
Install the appropriate terminal on the wire according to the requirement. Refer to appropriate parts catalog.



INSTALLATION OF TERMINAL

Follow the instructions provided with the crimp pliers (P/N 529 035 730) to select the proper position of the tool.

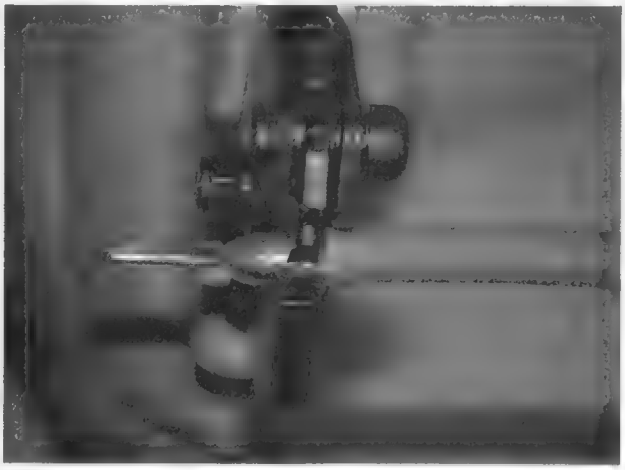
NOTE: Different wires require different crimp pliers settings, so make sure to follow the instruction supplied with the tool.



A32E2SA

POSITIONING THE CRIMP PLIERS
Step 1: Press
Step 2: Rotate

After positioning the crimp pliers, crimp the terminal already installed on wire.



A32E2TA

CRIMPING OF WIRE

A32E2UA

PROPERLY CRIMPED WIRE

To verify, if the wire is properly crimped, apply some pulling force on wire and the terminal at the same time from both directions.

CAUTION: Never solder the wire to the terminal. Soldering can change the property of the wire and it can become brittle and break.

Install the protective heat shrink rubber tube on the terminal. Heat the heat shrink rubber tube using the heat gun so that it grasps the wire and the terminal.

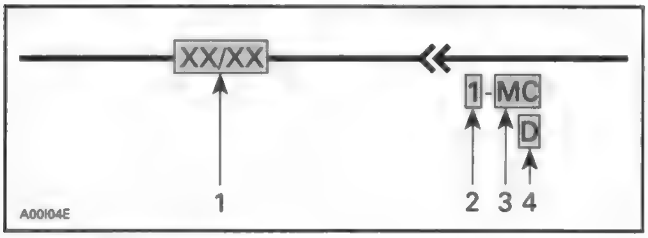
CAUTION: Make sure that the protective heat shrink rubber tube has been properly installed and no part of wire is exposed.

WIRING DIAGRAMS

WIRING DIAGRAMS

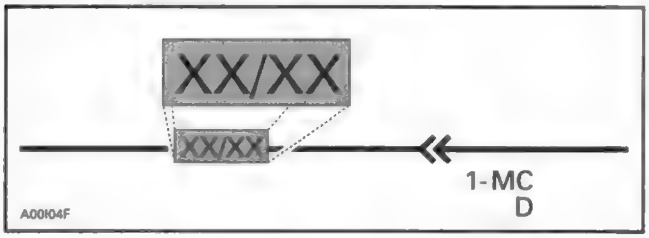
NOTE: Wiring diagrams are in the manual back cover pocket.

WIRING DIAGRAM LEGEND



1. Wire colors
2. Connector location
3. Connector code
4. Terminal position in connector

Wire Colors



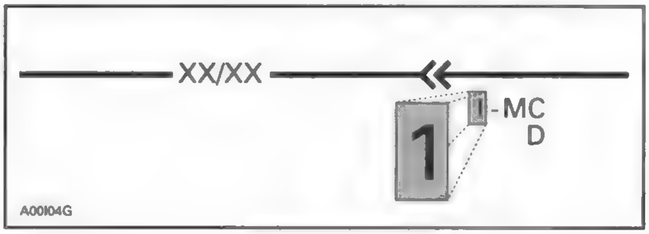
The first color of a wire is the main color, second color is the stripe.

Example: YL / BK is a YELLOW wire with a BLACK stripe.

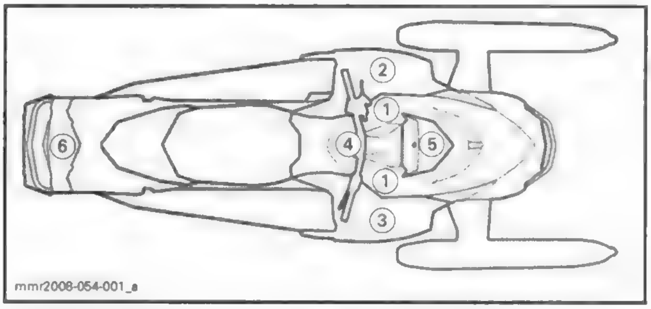
COLOR CODE	
BE — BEIGE	OR — ORANGE
BK — BLACK	RD — RED
BU — BLUE	VI — VIOLET
BR — BROWN	WH — WHITE
GN — GREEN	YL — YELLOW
GY — GREY	

Connector Location

The first digit of the connector identification number presents the location of the connector on the vehicle. It may also describe the part removal that is required to reach the connector.



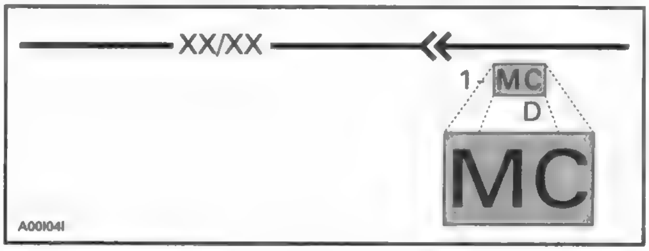
The location of the connectors are shown on the wiring diagram with a vehicle schematic as shown below.



VEHICLE SCHEMATIC FOR CONNECTOR LOCATION

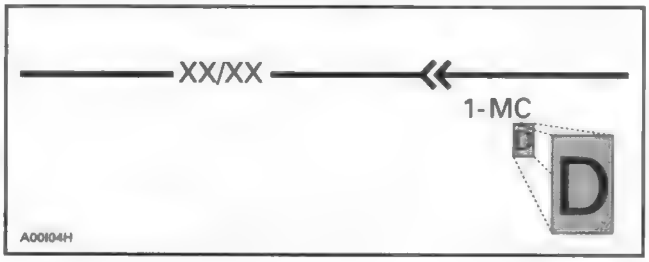
Connector Code

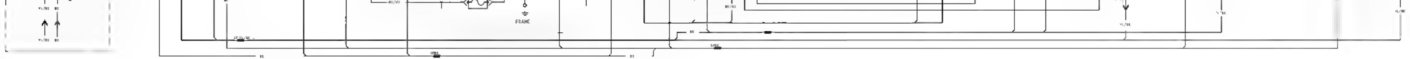
The next two letters of the connector identification number represents a connector reference. If there are many connectors in the same area this helps identify which wire is in which connector.

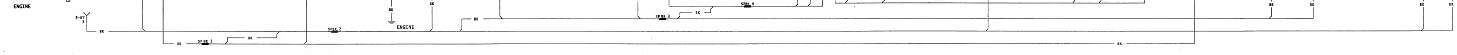


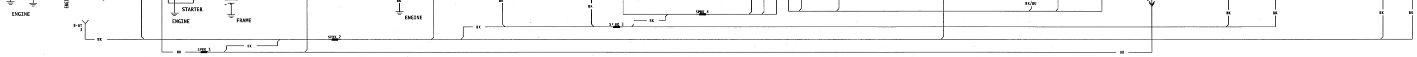
Terminal Position in Connector

The third portion of the connector identification number represents the location of the terminal in the connector. This could be identified by either a number such as 1, 2, 3 or by a letter such as A, B, C depending on the type of connector used.

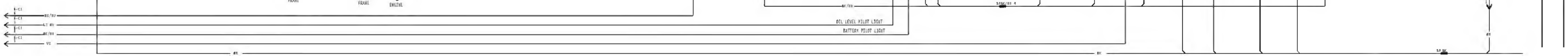


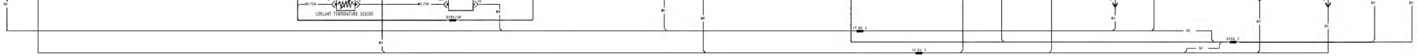

FRAME


ENGINE
9-07
BK
SP BK 1
SP BK 2
ENGINE
SP BK 3
SP BK 4



ENGINE
STARTER
ENGINE
FRAME
ENGINE
9-RT
3
BK
SPBK 1
SPBK 2
SP BK 3
SPBK 4
BK/BU


FRAME
FRAME
ENGINE
BK
OIL LEVEL PILOT LIGHT
BATTERY PILOT LIGHT
BK


BK
BK/GN
COOLANT TEMPERATURE SENSOR
BL/GR
S7BK/GR
BK
BK
BK
ST BK 1
SP BK 3
BK
SPBK 2
BK
BK
BK
BK

BK
BK/GN
COOLANT TEMPERATURE SENSOR
BL/GN
SPBL/GN
BK
BK
BK
BK
SP BK 1
SP BL 3
BK
BK
BK
SPBK 2
BK
BK
BK
BK